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ABSTRACT

This volume presents the results of a seminar sponsored by the Organisation for Economic Cooperation and Development and the U.S. Department of Education on the changing role of vocational education and training in Europe. The theme of the seminar--linkages between general and vocational training--represents a central concern of national policies as they redefine the role and position of vocational education and training in meeting new economic needs in ways that are educationally sound and, at the same time, satisfy the aspirations of young people. The general conclusion is that an essential requirement for any progress toward improving the effectiveness of vocational education and training is to raise its status and prestige in order to match those attached to more academically oriented education. In practice this means breaking down traditional separations between the two systems by reinforcing the educational component of vocational education and training while introducing more applied learning in general education. The book discusses these themes in the following eight chapters: "The Context and Rationale for the Reform of Vocational and Technical Education" (McFarland, Vickers); "The Political Challenge of Reforming Vocational and Technical Education: A Case Study from the United States" (Brand); "Tech Prep Education: An American Innovation--Linking High Schools and Community Colleges" (Warnat); "Compulsory Education and What Then?--Signals, Choices, Pathways" (Raffe); "Learning and Work: The Research Base" (Raizen); The Role of Employers and Unions in Facilitating the Transition to Employment and Further Learning" (Sako); "Policy Integration and Cooperation: A Persistent Challenge" (Drake); and "Linkages: A New Vision for Vocational and Technical Education" (Papadopoulos). Each chapter contains references. (KC)

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VOCATIONAL EDUCATION AND TRAINING FOR YOUTH:

Towards Coherent Policy and Practice

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FOREWORD

In 1990, the OECD launched a programme on the changing role of vocational and technical education and training (VOTEC). The activity included: country reports examining recent developments in national VOTEC systems and their responsiveness to changing jobs and needs of young people;[1] a cross-national study of educational pathways and participation in VOTEC;[2] a study on the integration of practical and theoretical learning;[3] and a series of international meetings providing lively information exchange and debates and culminating in a high-level conference in November 1994: "Vocational and Technical Education and Training for the 21st Century – Opening Pathways and Strengthening Professionalism".[4]

Four policy seminars focused on the following themes of particular interest to OECD countries:

- linkages between various types and levels of general and vocational education and training (this volume);
- implications of technological innovation for VOTEC;
- assessment, certification and recognition of skills and qualifications in VOTEC;[5] and
- advantages and pitfalls of modern forms of apprenticeship.[6]

This volume has its origins in an international seminar, hosted by Maricopa Community College in Phoenix, Arizona and organised jointly by the US Department of Education and the OECD as part of the OECD activity on the changing role of vocational education and training (VOTEC). The theme of the seminar – linkages between general and vocational training – represents a central concern of national policies as they grope towards a redefinition of the role and position of VOTEC in meeting new economic needs in ways which are educationally sound and, at the same time, satisfy the aspirations of young people. This is fully reflected in the complex range of issues taken up in this book, the articulation of vocational education and training with other sectors of education; the pedagogical implications of closer links between theoretical and practical learning, work-based learning and the role of industry; and the overall need for coherent national policies in this area, particularly the need for appropriate measures that ensure effective co-ordination across different government departments at both central and local levels.

If there is one general conclusion which emerged from the discussion at the seminar, and which comes out clearly in this book, it is this: an essential requirement for any

progress towards improving the effectiveness of VOTEC is to raise its status and prestige in order to match those attached to more academically oriented education. In practice this means breaking down traditional cleavages between the two systems. This in turn implies reinforcing the educational component of VOTEC while, at the same time, introducing more applied learning in general education. There are encouraging signs across all OECD countries, whatever their differences in the organisation of the educational systems, that this convergence between VOTEC and general education is beginning to be realised.

This book was prepared by Laurel McFarland, the Brookings Institution, and Margaret Vickers, Science Center TERC. The persons responsible for the organisation of the seminar were Winifred Warnat for the US Department of Education and Marianne Durand-Drouhin, in charge of the VOTEC activity at OECD. It is published on the responsibility of the Secretary-General of the OECD.

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NOTES

1. Reports on the German and Dutch VOTEC systems forthcoming in 1994.
2. Forthcoming in 1995.
3. Forthcoming in 1995.
4. Conference report forthcoming in 1995.
5. *Assessment, Certification and Recognition of Skills and Qualifications in VOTEC*, forthcoming in 1995.
6. *Apprenticeship: Which Way Forward?*, OECD, Paris, 1994.

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Chapter 1

THE CONTEXT AND RATIONALE FOR THE REFORM OF VOCATIONAL AND TECHNICAL EDUCATION

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and

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(at the time of the Seminar)

1. Introduction

Throughout the industrialised world, vocational and technical education and training (called VOTEC in this volume[1]) faces a crisis of identity and purpose. As the competition among manufacturing nations has intensified, governments have struggled to improve the vocational qualifications of their workforces. Yet their VOTEC systems seem poorly equipped to respond to what is demanded of them. In some countries, vocational education has become synonymous with low-level training and reduced expectations. In other countries, it represents a rigid track into which children are sorted at an early age, often before their academic skills and interests have fully developed. How do we resolve this tension between society's disillusionment with vocational education and the recognition that VOTEC is one of the keys to a highly skilled workforce and a competitive economy?

There are ways out of this dilemma. This book is based on a 1991 OECD conference where VOTEC experts from 20 countries met to discuss solutions to the problems their VOTEC systems are facing. Many of the issues which are germane to VOTEC reform are specific to particular countries or particular systems. Nevertheless, four key questions emerged as central in almost every case:

- How can the links among different sectors of the education system be improved, so that the pathways followed by students in VOTEC can be kept open for as long as possible?
- How can classroom-based learning be better linked to practical contexts, so that the relevance and effectiveness of the learning process is improved?

- How can links between schools and workplaces be established and sustained, and what contributions should firms be expected to make to VOTEC as it faces the challenges of technological and structural change?
- How can the full range of policies and programmes affecting VOTEC be co-ordinated across the different government departments?

Chapters 2 and 3 of this volume provide "a view from America" including illustrations of efforts to create links between high schools, colleges and the business community. Subsequent chapters develop a particular theme in response to one of the above questions. A unifying orientation across the four themes is that all of them analyse different aspects of the problem of linkage.

The **educational pathways** theme (Chapter 4) refers to linkages among different sectors of the education and training system. One of the harshest criticisms of initial vocational education is that too many VOTEC programmes are dead-end – they constitute traps which lead nowhere, when they should provide bridges to worthwhile careers and further education. Many of these dead-end VOTEC programmes are vestiges of a bygone era in which only the most rudimentary of academic skills were needed by those youths (and there were many of them) who entered the industrial economy at the end of compulsory schooling. What we now need are pathways through our education and training systems which keep educational opportunities open for all young people for as long as possible. At the same time, students need clear signposts to assist their decision making and guide them through the system.

The **integrated learning** theme (Chapter 5) addresses the need to link academic knowledge with practical action – to situate theoretical understandings in the context of real-world activities. This theme confronts the traditional divorce between academic education and vocational training, and argues that students in both tracks are impoverished by the existing divide. Learning and motivation to learn are enhanced if the concepts and skills being taught are embedded in situations that make sense and matter to the learner. Academic students are sold short when classroom knowledge is presented as a series of disembodied facts. Vocational students are also sold short when their teachers focus on specific technical skills and fail to develop the problem-solving abilities they need in order to become good learners.

Social partnerships (Chapter 6) are important to educators in a number of ways. In the context of rapid technological, structural and social change, there is an ever greater danger of mismatches between what schools do and what firms need. Because of this, the interest in creating strong and effective links between educators, employers and unions increases when the rate of change is substantial. Social partnership can also help smooth youth's transition from school to work. In recent years, American reformers have pursued incorporating work-based learning experiences to a greater degree to strengthen existing approaches.

The fourth theme, **institutional co-ordination** (Chapter 7), considers the linkages among government and private-sector agencies, as well as the vexed issue of intra-governmental co-ordination. In relation to the effective delivery of vocational and technical education and training, what advantages do the regulated economies of Germany and

Austria have over unregulated economies such as those of the United Kingdom and the United States? What are the likely benefits of improved intra-governmental co-ordination? Would the government's education and training policies be more effective if departments of Education and Labour worked towards commonly agreed objectives rather than pursuing separate (and sometimes contradictory) goals?

These four "linkages" themes indicate the complexity of the problems facing vocational and technical education and training. By its very nature, the VOTEC crisis demands a multi-faceted response. School-level reform is needed, but this is not enough. At the systemic level, solutions to the VOTEC crisis demand the co-operation of employers, firm-based trainers and other employees, higher education institutions, education departments and departments of labour. While the practical implementation of VOTEC reform depends on co-operative links among public and private sector institutions, its intellectual basis depends on conceptual linkages that must be developed across several different fields of scholarly endeavour.

New directions in VOTEC

For policy makers involved in the provision of vocational and technical education and training, the 1990s will be a decade of unprecedented change. Between 1985 and 1992, national reform bills introduced sweeping changes to the vocational and technical (VOTEC) systems of the United States, the United Kingdom, France, Australia and New Zealand.[2]

As the competition among manufacturing nations has intensified, governments have become convinced they must improve the vocational qualifications of their workforces. The issue of vocational and technical training is high on the political agenda in almost all OECD Member countries.

VOTEC – probably more than any other sector of the education establishment – is subjected to conflicting demands from a diverse range of stakeholders. VOTEC is expected to cater for the most disadvantaged students at the secondary level, yet it must set high educational expectations for their achievements. VOTEC educators are expected to provide sound academic foundations while at the same time promoting competence in practical activities. VOTEC is expected to prepare students for the world of work, but it must also prepare them to engage in further learning in post-secondary educational institutions or in the workplace. With VOTEC, both schools and private sector firms are joint stakeholders in the planning and delivery of education and training services. This increases the complexity of establishing policies and curricula for VOTEC, as extensive transactions are required among employers, unions, government officials and educators.

2. The crisis in vocational and technical education and training

The difficulty of meeting these complex challenges should not be underestimated, and there are indications that VOTEC systems are failing to achieve what is expected of them. For example, declining enrolments in initial VOTEC courses suggest something is

awry.[3] Reflecting trends which are evident in several OECD countries, enrolments in area vocational schools in the United States are down. Around the world, the proportions of young people choosing academic rather than vocational options at the secondary level is increasing. Even Germany's dual system, which inspires much admiration abroad, is undergoing change at home. Enrolments in the *Hauptschulen* (vocational high schools) are half what they were in the early 1960s, while enrolments in the *Realschulen* (intermediate technical schools) and *Gymnasien* (academic high schools) have doubled. Between 1984 and 1990 the number of West German youths seeking apprenticeships dropped from 765 000 to 600 000 (*The Economist*, 1992, p. 12).

Yet industrial and business leaders insist that future workforce productivity will depend critically on the supply of skilled technicians in ever larger numbers and with increasingly sophisticated skills. They want high school graduates who are ready for work – able and eager to learn new skills, reliable, responsible, and organised. If this is what business wants, why is secondary-level vocational and technical education apparently so unpopular with parents and policy makers alike?

The litany of charges levelled against America's secondary vocational system is an all-too-familiar one. Too many students leave school without the competences they need to enter successful careers. Students are often unable to use what they do know, because the links between school-based learning and working knowledge are inadequately developed. All too often, vocational track students acquire technical skills that are already obsolete in the modern workplace. At the same time, they are unable to benefit from training programmes provided on the job training. The reason for this is that while college-track students are taught to read, write and study, courses for vocational-track students tend to favour practical, workshop-based activities rather than generic skills. It is not surprising that vocational students rarely discover how to be good learners.

A sense of urgency about these problems is now evident not only in America, but in many other OECD Member countries. One common problem is that the linkages between initial vocational education and further or higher education tend to be weak. Historically, most VOTEC systems prepared youth for work, rather than preparing them for higher education. When the technologies used on the production line were simple and the rate of change was slow, only rudimentary training was required to equip youth for work. In the past, the practical skills acquired through apprenticeships or secondary vocational programmes were sufficient. Today, things have changed: a great deal of low-skill work is exported to developing countries, jobs at home are getting cleverer, and the durability of initial skills is getting shorter.

In this context, secondary VOTEC simply cannot survive in its present form. Already, many students are choosing to complete a full secondary education in academic or comprehensive schools, deferring their technical and vocational training to the post-secondary years. In Germany, for example, the proportion of students completing the *Abitur* examinations *before* entering apprenticeships is steadily increasing. In Australia, high school completion rates have doubled in the last decade and vocational and technical education is rapidly becoming a post-secondary phenomenon. In the United States, state policy makers have increased the number of academic courses required for high school graduation, thus squeezing vocational courses to the margins of the curriculum and

precipitating a sharp decline in enrolments in area technical schools. In general, early specialisation and narrow technical training are becoming less attractive options.

What then, is the future of vocational and technical education and training? Are recent economic changes and educational reforms pressing inexorably towards a fully comprehensive model of secondary education? If so, will specialisation into vocational and technical education and training essentially be deferred to the post-secondary stage? Or alternatively, does the contrary trend towards the inclusion of more applied courses in secondary schools imply that the influence and importance of VOTEC is waxing rather than waning?[4] Are the trends in the more regulated systems, such as Germany and Sweden, different from the trends observed in unregulated systems such as the United States and the United Kingdom? The next two sections of this chapter begin to answer these questions by looking at the economic and educational contexts of VOTEC reform.

3. The economic context

The changing international economy has finally come home to roost in the living rooms and classrooms of OECD countries. Past and distant discussions of trade balances and current account deficits have become urgent daily discussions of falling wages and productivity rates. Since VOTEC has been increasingly viewed as a policy instrument in the hands of some government officials, it is important to separate the rhetoric of competitiveness discussions from the evidence. Several economic themes are relevant to the discussion of VOTEC reform:

- the increased industrial output of non-OECD countries and the related downward pressure on wages in OECD Member countries;
- the contribution of demographic change, declining educational quality, and technology to the creation of skills "gaps", as new workers' skill levels decline and employer skill requirements advance;
- increased wage inequality (by educational attainment) within countries due in part to falling wages and higher unemployment among the less-educated workers.

International competition

All OECD Member countries are experiencing the effects of heightened international competition. Porter's calculation of countries' shares of exports in various competitive industries shows that in sectors like transportation, textiles, telecommunications, petroleum, chemicals, office products, and metalworking, most OECD nations lost world market share between 1978 and 1985, often to newly industrialising countries, and sometimes to each other (Porter, 1990). The trend has continued into the 1990s (Baily, 1993, p. 36).

This declining market share, in combination with changes in production and distribution technologies, have led to massive restructuring in many firms within the OECD

area. Many firms have laid off workers, or changed the composition of their workforces, shedding workers whose skills no longer match their needs.

In addition, the lower wages earned by workers in newly industrialising countries have put downward pressure on workers' wages in many sectors of OECD countries' economies. To stave off competition from low-wage producers, some firms have adopted the strategy of cutting wages. Others have tried to increase productivity through different combinations of investments in technology and training. Both low-wage and high-skill/high-wage strategies have serious consequences for the future of VOTEC in OECD Member countries.

Skills gaps?

Are OECD Member countries experiencing skills "gaps", in which firms' demands for skills are rising, but individuals' educational attainment and skills acquisition are falling?

Governments in some OECD nations have been projecting serious skills gaps in the near future, with newly created jobs demanding more skills and schooling than the new entrants to the labour force possess. Canada, for example predicts that nearly two-thirds of the new jobs will require more than 12 years of education and training, and half of those will require more than 17 years of education and training.[5]

In the late 1980s, many economists argued that OECD economies would be headed into a long-term skilled labour shortage. The combination of falling birth rates and deteriorating educational performance (in some countries, notably the United States) suggested that skilled workers would be at a premium. Coupled with projections of leaps in technology and knock-on effects on employer demands, the possibility seemed quite alarming.

Overall, though, the OECD has found only mixed evidence of skills gaps in OECD countries in the 1980s (OECD, 1992*b*). The general conclusion seems to be that at present levels of technology and training, skills gaps are limited, but that future economic and demographic trends may increase their likelihood.

And, as the world economy cooled in the early 1990s, fears of impending skills gaps eased somewhat. But the underlying trends, such as demography, remain. Declining birth rates, longer life spans, and changes in immigration in OECD Member countries like Belgium, Denmark, Finland, Switzerland, Germany, and Sweden will mean that there will be relatively fewer young people entering the labour force, with an increasing proportion from minority or immigrant groups. Though there are a few exceptions (Ireland, for example), most OECD nations must confront the need to make these smaller groups of labour force entrants more productive and to alter traditional education tracking and sorting mechanisms in order to enfranchise immigrant children.

The less-educated get poorer

For many OECD Member countries, one of the most alarming labour market developments of the past decade has been the increasing earnings gap between workers of different educational attainments. After a general narrowing of wage gaps in the 1970s, recent research on the 1980s has pointed to rising wage inequality between workers of different education levels within many OECD Member countries, including the United States, the United Kingdom, Sweden, Canada, Australia, and Italy. Low-skill workers are both relatively and absolutely worse off than they used to be. It appears that industrial and occupational shifts have given advantages to highly educated workers across OECD countries. Evidence points to two explanations: the shifts in supply and demand of workers with different levels of education, and the breakdown in centralised wage bargaining in many countries (for further economic analyses of income distribution within different OECD countries, see National Bureau of Economic Research, 1992).

Some countries have not experienced this trend of increased earnings gaps between more and less educated workers, notably Germany and France. France's more egalitarian distribution seems to be attributable to its higher minimum wage and union influence on national wage structures. But even in these countries, union power and social policies supporting high minimum wages have been put under pressure by external economic conditions (as well as domestic politics).

Unemployment trends have only intensified the inequality: joblessness afflicts lower-skill workers more than the highly skilled. As mentioned above, certain sectors of the economy, including those industries traditionally staffed by VOTEC participants, also bore a disproportionate share of the early 1990s unemployment increase. And youth unemployment, especially among drop-outs and school leavers, continued to be a problem in many OECD countries throughout the 1980s and early 1990s. Austria, Belgium, Germany, the Netherlands, Spain, and Switzerland have faced chronically higher rates than they had in the 1970s, and even in the tight labour market that prevailed in the late 1980s, the unemployed were not absorbed very quickly into those economies.

Unfortunately, the usefulness of education and training in combating unemployment seems ambiguous. In most OECD countries it is certainly the case that workers with only lower or upper secondary attainments suffer higher unemployment rates than those with higher education credentials (OECD, 1992*b*, graph R6).[6] Some of this unemployment was the result of skills mismatch: employers wanted skills that the unemployed lacked (for further discussion, see OECD, 1992*a*, Chapter 2). But at the same time, as the OECD has reported, in Canada, Australia, Finland, Japan, Norway, and Sweden, more educated workers find it just as hard to re-enter the labour market after bouts of unemployment as their less educated peers (OECD, 1990, p. 17).

The OECD has examined the relationship between education and the changing world economy before, but not with specific reference to VOTEC. In 1988, the OECD held an Intergovernmental Conference to discuss how nations could adapt their educational systems to the economic change of the 1980s. As part of the more general discussion of the reform of initial schooling, the participants recognised that one almost universal response to economic trends in many OECD countries was the expansion of

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vocational education, particularly outside the formal sector. Further, they noted that this expansion of vocational education was occurring at the same time that academic options and tracks were multiplying. The result, they noted, was a confusing "jungle" of post-secondary options in many countries (OECD, 1989, p. 53).

Thus, an examination of the economic context of education reform in OECD nations suggests that the *strategies* adopted by firms to deal with increased world competition will be crucial in charting the future course of VOTEC. High-skill strategies will demand more and better VOTEC provision. The prospect of skill *gaps* will remain in the 1990s, due to demography and rising employer skill requirements. VOTEC must be relevant and flexible if it is to be an important factor in preventing gaps. From an *equity* perspective, VOTEC should take some role in enhancing the economic prospects of the low-skilled. The low-skilled workers in most OECD countries are faring worse than ever compared to their more educated peers: the gap has opened significantly over the last two decades.

4. VOTEC reform and the broader educational setting

The social and economic changes of the last two decades have clear implications for VOTEC reform. However, attempts to reform VOTEC without paying attention to the broader educational setting are unlikely to work, because the contextual changes described above are resulting in reforms which are changing the entire structures of the public education systems. For example, as the security and economic well-being of the least skilled workers declines, the demand for respected credentials increases. In Germany, this is associated with a move away from the *Hauptschulen* and lower-level apprenticeship training towards the *Realschulen* and more advanced technical training. In the United States, Australia, and most European countries, it means growing demand for admission to higher education. In turn, this puts pressure on the secondary schools. As already noted, high school completion rates in several OECD Member countries are on the increase, as are the proportions of students choosing the academic tracks within high schools.

Reforms within the VOTEC sector are important, since the skills demanded of all workers are now of a higher order than in the past. One aspect of these reforms is to strengthen the academic content of initial VOTEC. Another is to modernise the curriculum and align it with recent innovations in industrial technology and production methods. Yet no matter how diligently these reforms are implemented, they are not likely to stem the declining popularity of initial vocational education and training. In effect, traditional secondary vocational and technical education is being pushed to the margins. This is especially true in deregulated systems such as those of the United States and Australia, where many students who will eventually enter the labour market as technicians and artisans are now completing college-track programmes and deferring vocational and technical education to the post-secondary level. A more regulated approach is evident in the Nordic countries, where legislation passed in the 1980s stipulated that there would be no vocational specialisation in the curriculum before the end of the compulsory years. Students now complete a general education certificate (around age 16) before they choose between the academic and vocational pathways (Hamilton, 1988).

None of this should be taken to imply that vocational and technical training is becoming less important. On the contrary: vocationally oriented education seems to be gaining ground in at least three ways. First, high-level commissions and influential think tanks in numerous countries are calling for a greater investment in skill formation, demanding stronger training commitments from employers and educators alike (for United States, see the Commission on the Skills of the American Workforce, 1990; for Australia, see the Employment and Skills Formation Council, 1992). Second, as high school completion rates increase, the courses offered in the final two or three years become more diverse (see Chapter 4 in this volume). For example, in the United Kingdom the Technical and Vocational Education Initiative (TVEI) has resulted in the addition of vocationally-oriented options to the narrowly academic senior-school curriculum, while in Australia the same trend is exemplified by the growing range of "non-tertiary entrance" subjects approved for high school graduation. Finally, cognitive research findings which demonstrate the efficiency of contextual learning are slowly filtering into educational practice. As this occurs, an increasing number of school-based programmes are using vocational subject matter (or even real workplaces) to situate formal knowledge in ways which make their relevance and utility most evident to the learners (see Chapter 5 in this volume).

These trends suggest that VOTEC systems are now subject to the cross-currents of contrary pressures. In many countries, initial VOTEC seems to be losing ground. The early conscription of children and young teenagers into low-status vocational programmes is becoming more and more anachronistic in the modern industrial state. Too many of these programmes select children whose educational expectations are already low and then demand too little of them. The courses they take are narrowly focused and do little to help them understand the complexity of their powers and responsibilities as citizens. When they are ultimately released into the workforce, the skills they have acquired equip them for only the most dead-end of jobs. These versions of initial VOTEC are neither democratic nor economically rational, and the backlash against them is well deserved.

Yet there are other countries in which initial VOTEC continues to thrive. In Germany, for example, the dual system is still strong, despite the tilt away from low-level vocational qualifications towards middle-level technical ones. To some extent, this can be attributed to the regulated nature of the German economy. In Germany, customs and regulations prescribe that an individual must hold an apprenticeship certificate in order to be entitled to practice a trade, and almost all forms of skilled work are so regulated. Regardless of his or her ability, a young worker without an apprenticeship certificate faces enormous difficulties in entering the labour market. German youth who want to signal that they are of above-average ability complete their *Abitur* and then enter an apprenticeship.

In contrast with the German case, in most other OECD countries, secondary-level vocational qualifications are tending to lose their market value. This is partly because firms are generally organised as internal labour markets, and prefer to recruit untrained but able youth. In addition, technological change has rendered specific, low-level vocational skills less relevant than they once were. As overall high school completion rates increase, students who enter the vocational track at an early age and fail to qualify for

post-secondary courses become more and more stigmatised. Thus, a promising strategy for improving the quality and status of initial VOTEC in the United States is to ensure that VOTEC students are qualified for post-secondary education and training. To achieve this, "two-plus-two" Tech prep programmes (which connect the final two years of high school with two-year community college programmes) are being created through financial incentives provided by the federal government.

It seems that VOTEC systems are being asked to keep students' educational and career options open for longer, to develop broader and less instrumental curricula, and at the same time to increase the quality and relevance of the technical training they deliver. Attempts to achieve this ambitious agenda involve some combination of the following strategies: deferring selection into initial VOTEC, and eliminating VOTEC tracks and VOTEC schools at the lower secondary level while simultaneously increasing the proportion of VOTEC courses offered at the senior secondary or post-secondary levels. Additional strategies include creating closer links between schools and the workplace, placing greater emphasis on academic studies in an applied context, and opening new pathways from the secondary vocational sector into higher education. Together, these strategies hold out a promise that VOTEC can meet the international economic challenge of building a skilled workforce while at the same time responding to the social challenge of expanding educational access and opportunity.

NOTES

1. "Votec" is the generic term used throughout this book to refer to OECD countries' vocational and technical education systems. Nations' education and training systems vary, so this term is used only in a general sense.
2. The reform bills referred to are as follows: In France a new vocational *Baccalauréat*, negotiated with the social partners, was introduced in 1985. It is intended to lead directly to employment. In 1987, the UK government made a historic move towards promoting vocational and technical studies in the secondary curriculum through the TVEI bill. In the United States, the 1990 Perkins Vocational Technical Education Act reauthorisation represented a radical departure from previous vocational and technical education legislation, as discussed in Chapter Three. The Australian federal government committed itself to a prominent role in the funding of the previously state-controlled Technical and Further Education system in 1992, and promised radically to restructure all training arrangements, including the apprenticeship system. New Zealand thoroughly revised its apprenticeship system in 1992.
3. In Australia, where several states once provided academic and technical education in separate high schools, secondary education to the end of grade 10 is now fully comprehensive.
4. TVEI promoted inclusion of applied courses at the senior levels, modifying the exclusively academic orientation of the final two years of secondary schools in England and Wales. In Australia, where the traditional function of the final two years of schooling was to prepare young people for higher education admission exams, the recent sharp increases in retention rates have led to a diversification of the curriculum and the inclusion of new work-related courses.
5. Projections are from the Labour Market Outlook and Structural Analysis (LMOSA) Branch, published in "Success in the Works: a Profile of Canada's Emerging Workforce", *Employment and Immigration Canada*, 1989, p. 9.
6. This comparison does not control for differences in ability, age, or personal characteristics between educational groupings.

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Chapter 2

THE POLITICAL CHALLENGE OF REFORMING VOCATIONAL AND TECHNICAL EDUCATION: A CASE STUDY FROM THE UNITED STATES

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The policy seminar on Vocational and Technical Education, convened by the Organisation for Economic Co-operation and Development (OECD) and the United States Department of Education marked a significant development in American education policy. The discussion of vocational and technical education and training (VOTEC) in an international setting demonstrated that VOTEC in the United States has come a long way from the days of "shop" and home economics. VOTEC education now appears to be a critical component in preparing a skilled workforce for the future which will ensure America's competitive position in a global economy. Yet it has not always been viewed this way in the United States. Only in the past several years has the connection between VOTEC and the American economy been drawn.

The OECD's focus on vocational and technical education is significant in itself. VOTEC education is often not discussed in education circles. Most of the focus of education reform has been on academic education, or education as preparation for higher education, not on the topic of education for the workplace. But times have changed. Keeping a single focus on academic education for the sake of education will not help the United States produce the workers it needs and will not maintain viable industries nor attract or create new ones.

In the United States, the phrase "reform the education system" has been uttered time and again over the past decade. It has been used by presidents, senators, members of congress, governors, state and local legislators, parents, businesspeople, researchers, practitioners, teachers and administrators. Occasionally, those words are preceded by the words, "We do not need to reform our education system", and spoken by those who fear

change or think the status quo is best. But more often than not, Americans are expressing a desire to improve the education of American children.

Public opinion surveys show that most Americans believe their education system does need to be reformed. Studies show that American students are performing at academic levels no higher than they were twenty years ago. For a period of a few years, students' performance on standardised math and language tests did decline, but then recovered. Despite the recoveries, the performance of students today is no better than it was in 1971, and yet, so much of the world has changed. Calls for education reform were initially prompted by those who saw these consistently flat performance charts in a world which demands consistently higher performance.

In 1983 the United States National Commission on Excellence in Education released *A Nation at Risk*, a landmark report which had a profound influence on the general public with regard to education reform. For the first time, a call to the general public to become involved in education reform was sounded clearly and comprehensively. A phrase from that report bears repeating, as so much of the public took it seriously and began demanding action:

> "Our Nation is at risk. Our once unchallenged pre-eminence in commerce, industry, science, and technological innovation is being overtaken by competitors throughout the world (...) We report to the American people that while we can take justifiable pride in what our schools and colleges have historically accomplished and contributed to the United States and the well-being of its people, the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and a people. What was unimaginable a generation ago has begun to occur – others are matching and surpassing our educational attainments."

A Nation at Risk demanded and received attention. The report was written by a commission, appointed by the Secretary of Education, consisting of high-level and well-regarded American educators. The fact that the Secretary of Education had created this Commission to review the quality of education in America lent credence to the findings and helped raise awareness of the issues surrounding education reform. For the first time, the President and the Executive Branch of the government were concerned about the quality of education in America.

The traditional role of the Department of Education in the United States has been to guarantee access to educational programmes for the disadvantaged and disabled; to guarantee and protect the civil rights of American students based on race, sex, age, and disability; to collect and maintain national data and statistics; and to conduct and support research and demonstration projects. For years, the executive branch carried out this role, with the limits just described, never focusing on the quality of education.

However, in the late 1970s and early 1980s, parents and business leaders began talking about the poor quality of the education provided to secondary school students. Parents saw that their children were not spending time on homework, that the curriculum was, in many cases, not demanding, that classes were not disciplined, and generally that their kids were not learning as much as they should, or could, in school. Business leaders, who hired high school graduates, complained of the poor quality of the graduates, and

that a high school diploma meant nothing more than a sign of a student's perseverance to finish twelve years of school. Teachers and administrators continued to be faced with flat test scores and low performance on standardised tests. Policy makers at the federal, state, and local levels were beginning to ask what they were getting for the billions of dollars being poured into education. At the same time, American businesses were being confronted with vast and dramatic changes in the global marketplace. American businesses were closing, moving offshore, losing huge market shares, and finally recognising the challenges from the Asian and European economic blocks.

Slowly, the connection between the country's economic health and education was being made. In the early 1980s policy makers were beginning to talk about the connection between education and training and economic development. Hearings held by the US Senate Subcommittee on Employment and Productivity focused on the key factors that business executives considered when they were deciding where to locate a new plant or facility. Business executive after business executive said the main factor in their decisions was the quality of the education system in the community and the overall educational level of the workforce. Some of the general public, but mostly the private sector, believed the notion that economic development and economic health were linked with education, but it was not until *A Nation at Risk* that this premise became widely accepted.

Once it was accepted that economic development and health and education were intricately linked, business jumped on the bandwagon of education reform. Clearly, the products they were receiving from schools were of poor quality and not good enough to maintain or reach a stronger economic position.

With business and industry putting pressure on the education system, policy makers also became very interested. The federal government had already embraced the *Nation at Risk* report and began making a case for education reform by providing leadership to improve education. For the first time, the Executive Branch began to see that it had a role to play in ensuring quality in schools. Today, it would be safe to say that a new role has been added to the Department of Education, providing leadership for change and promoting quality.

While the initial focus of the education reform movement was on secondary education, fairly strictly delimited by the traditional American high school with a college preparatory curriculum, throughout the 1980s and into the early 1990s, attention shifted to focus on early childhood preparation, adult retraining, and VOTEC education. While major efforts in education reform are occurring in all of these areas, the focus of this chapter is on vocational and technical education.

The private sector, in particular, has been increasingly interested in the capability of American schools to produce graduates who are capable, flexible, and technically-trained workers. Increasingly, business is interested in the vocational programmes in communities and are working with educators to improve them. In addition, business and industry have understood the demographic picture facing the United States, in which every American will have to work to achieve his or her fullest potential. No longer can industry select its workforce and leave the rest for low-skilled jobs. To remain competitive, business needs flexible workers, with good analytical and solid basic skills. New jobs,

technology, and reorganised workplaces are requiring multi-skilled workers with strong language, math, reasoning, problem-solving and analytical skills.

Yet, to a large extent American schools have forgotten that they prepare students for the world of work. Many schools are happy to prepare students for the world of post-secondary education, and most particularly, a baccalaureate degree. Students who do not fit this mold are often neglected and allowed to drift out of school before graduation, progress through school without clear goals, or leave with no clear path to a job or further education and training. Many counsellors advise students on college preparation and selection. They are rewarded for how many students go to colleges, especially four-year institutions. Counsellors know the educational pathways, from high school to college, to Masters and Doctoral degrees. They are not rewarded for the number of students they place in jobs, and they generally do not know much about the world of work or what skills are required to be successful in the workplace.

Currently close to 60 per cent of American high school graduates go on to post-secondary education. But of that group, only roughly 25 per cent receive a baccalaureate degree. The United States is focusing most of its efforts on a quarter of students and ignoring the rest.

Business would recognise this as a waste of human potential from an economic and competitive standpoint. Others have become increasingly concerned with the waste of potential from a purely human point of view. The tradition of public education in America has been to allow each individual to reach his or her fullest potential and participate in the American dream. Children still hear tales of the penniless orphan, who through dedication, effort, and education, became a success in life. American schools still do a good job of helping the top of the class succeed, but they fail to provide many children with the skills and education they need to succeed in today's America. The education system must find a way to enfranchise all citizens. For a large number of these students, VOTEC education will be the part of the system that empowers them.

Succeeding in today's world requires a wide variety of skills. The low-paying, assembly line jobs that were available for a good hourly wage, with little or no education, are gone. Since the US had a surplus of labour, little or no technology requiring workers with high literacy and numeracy skills, little or no foreign competition, and a superb system of higher education that produced enough top performers to carry the economy, American schools did not have to worry about children who did not have the goal of going to college.

But today, the American economy is not isolated: it is interdependent with other nations. Technology has invaded workplaces and homes. There is a declining supply of labour force entrants. Human resources are the competitive edge for the American economy. Business and industry are demanding changes in the education system and are demanding performance and high standards from graduates. Business and industry need good products (students) coming from schools, and they need a supply of technically-trained workers.

The pressure for education reform especially in vocational and technical education has been driven in large part by the business sector. While some policy makers have shown tremendous leadership to reform education, business has put the pressure on

schools to change. It is difficult to change education from within. Pressure from the business community is vital to ensure continual reform.

So within this context we ask, how can American society make education, and in particular VOTEC education change? First, it is important to understand that change is difficult, indeed sometimes impossible, to mandate in the United States because of the decentralised system of education. The federal government does not have constitutional authority for the education of its citizens, only a responsibility to guarantee civil rights and equal access, as mentioned previously. The fifty states are given the constitutional authority to fund and provide education, and local communities supplement that with their own funding and direction. The federal government provides only about 7 per cent of total education funding in the United States, although in VOTEC education, the federal contribution is slightly higher at 10 per cent.

While its contribution is small, the federal government can leverage the contribution in VOTEC and begin shifting policies and programmes. The federal government sets policy for the states to follow, but states have tremendous flexibility in operating programmes apart from the federal programmes and they may have a purpose very distinct from the federal government. That is why continued input and pressure from the business sector to keep improving the product is so important.

One positive sign is that the federal government has a well-developed relationship with the fifty governors, who are supportive of its efforts to improve education. However, some governors put a very high priority on vocational and technical education in their state reform strategies, while others pay it little heed. In the first instance, change is very likely to occur. In the second, little change occurs. Therefore, one of the most basic and essential partnerships that must exist for change in VOTEC education is to have strong state leadership working in concert with national policy makers, and with business to bring about change. This coalition approach is most effective.

The best model for change is to have states or localities experiment with a programme or model, test it out, and prove that it works so well that it gains acceptance nationally. At that point, the federal government can step in and fund start-up activities in all states. Generally, policy experience indicates that many good ideas generate from the state and local level, rather than from the federal level.

Clearly, developing a consensus of the appropriate groups is critical. In VOTEC reform, consensus-building efforts have included business, federal, state and local policy makers and legislators, and educators involved in vocational and technical education. However, VOTEC education is still viewed by many traditional academic educators as an "outcast", and is left on its own. Reforming vocational and technical education, involves integrating it into the general education system, so that it is part of every student's curriculum. Lines between academic and theoretical education must be blurred to include vocational and applied learning.

Another group that must become more involved in the reform of VOTEC education and training is parents – and society in general. This is due in part to the strong value society places upon a college degree – part of the American dream begun with the GI Bill following World War II – and due in part to the low value society places on technical and skilled craft work. (The GI Bill is the 1944 Act passed by the Congress which enabled

World War II veterans to attend college or obtain vocational training. It provided tuition and a living allowance.) Parents want their children to go to college: parents generally do not want their children to enter vocational and technical education. America does not have a culture of valuing the skilled crafts and trades, as many European nations do. Americans have built their country's economic strength in a few centuries, without a long tradition of skilled trades, and public attitudes generally credit America's strength to mind-work, not handiwork.

Because the general public, parents, and academic educators have not embraced vocational and technical education, there is a widespread perception that VOTEC education of today is no different than the shop classes of the 1950s, and that VOTEC education classes are the "dumping ground" for students who are not performing well in academic classes. However, nothing could be further from the truth. Vocational and technical education is making dramatic changes, and in many cases providing an opportunity for experimentation in education. It may be occurring out of the limelight, but it is having a significant impact on students' lives and achievements. For instance, VOTEC education has been successful in reaching many children through its applied curriculum, which makes connections between theory and practice. For the thousands of students that drop out of school due to disenchantment and boredom, VOTEC is recapturing them and is making education more "real" for them.

Reform efforts in VOTEC education have also included the creation of a new programme called *tech prep* (technical preparation) that provides a four-year sequence of courses (beginning in the 11th grade and continuing through two years of post-secondary education), leading to a technical certification or associate degree. This programme, now widely hailed, relies on the applied curriculum, with strong academic material integrated into the coursework, and a rational sequencing of courses in a particular occupational field, such as health or manufacturing. The programme links high schools with community and technical colleges and eases the student's entry into post-secondary education. The programme lays out a clear path for the student, with clear goals. In addition the programme is helping to improve the image of vocational technical education, especially with parents, because it results in a post-secondary degree. This programme, along with stand-alone applied curricula, has helped keep students in school while teaching them challenging and difficult academic material.

VOTEC education has also led the education world in developing strong, deep, and meaningful partnerships with the private sector. Many business education partnerships in the United States fall into the category of equipment donations or adopt-a-school relationships, which have no affect on curriculum or classwork. In the area of vocational and technical education, business has become a participant in influencing curriculum and has helped to develop new curricula based on new technology through providing teachers and faculty opportunities to visit and work in the private sector, sharing employees as classroom instructors, developing work experiences for students, and placing students in jobs upon graduation. These activities go beyond what exists in other business-education partnerships.

Vocational and technical education is also developing well-rounded students that understand the world of work and possess the skills that business desires. Through ten

vocational student organisations with millions of student members, students learn about the world of business, marketing, distribution, health, and agribusiness, while they gain leadership and speaking skills, learn to work as part of a team, and develop a work ethic.

Also, VOTEC education and training is providing students with work experience in firms. Work-based programmes, apprenticeships, co-operative education, and internships are all examples of programmes that have been developed under the umbrella of VOTEC education and training. Students who have participated in these programmes will start out ahead of their peers in the work world.

Finally, vocational and technical education is leading the way in developing performance standards for its programmes. These standards are outcome-based, and reflect input from the private sector on what is expected. Because VOTEC has close ties to business, teachers and students understand the importance of outcome measurements and performance standards. Academic education continues to shy away from being measured and is thus disconnected from the way the private sector operates.

The public is becoming aware of the achievements and innovation in VOTEC education, and more and more governors and policy makers are turning to VOTEC as an answer. The 1990 reauthorization of the federal vocational and technical education programme, the Carl D. Perkins Vocational and Applied Technology Education Act, recognised the innovation and supported the change occurring in VOTEC education. It attempts to institutionalise that change in a flexible framework, and provides support for start-up activities. The fundamental premise of the Perkins Act is that vocational and technical education must be linked to economic development, and that VOTEC is a critical component to developing a skilled workforce.

The US Congress's approval of this legislation gave credence to many of the exciting innovations occurring around the country in VOTEC education. And academic educators have begun to pay more attention to key VOTEC principles: the integration of academic material with vocational and occupational curricula; the idea of applied learning and relevant curricula; hands-on learning experience for students whose learning styles do not fit the traditional lecture approach; and a focus on students who may not achieve a baccalaureate degree.

In addition to supporting these trends and changes in the programme of vocational and technical education, the federal government must build partnerships with a variety of groups to provide increased status for technical training, to ensure a viable path for students, and to develop high standards for training and education.

The federal government, as part of its new role in promoting quality education, has placed great emphasis on raising the public debate on accountability in education. The federal government sees its role in promoting quality as that of a catalyst and convener of the interested and affected groups. The federal government must continue to raise public awareness about the need for realistic outcome measurements, fund basic research in reliable assessments, and bring together the appropriate individuals, groups and agencies, to discuss how to proceed. Standards will play a critical role, but it is important that they remain voluntary. Based on the previous discussion of the independence of the states with regard to education, and the small role of the federal government, nothing would bring about a revolt quicker than to mandate performance standards for education.

While vocational and technical education has made significant progress and should continue to improve, it has yet to be fully integrated into a comprehensive system of lifelong learning. No one is sure what a system of lifelong learning should look like, however, or what the appropriate federal role is in developing such a system. There is agreement, however, that it is to the advantage of the country to encourage lifelong learning on the part of employees, and that all workers will need to continue to learn to remain efficient. Federal policies have begun to recognise this and are rapidly increasing support for adult training and retraining. But it is still unclear how the reform of the education system and VOTEC education in particular will fit into a larger system.

Providers of education and training and human services, the private sector, government, and policy makers all agree that there must be greater co-ordination among systems, to ensure a seamless delivery system. This means that regardless of where an individual enters the education and training system, he will be assessed to determine his needs and referred to the appropriate programme or programmes, and that there will be some monitoring of the progression of the individual through the system.

What prevents this from occurring now is the structure of federal assistance programmes, which possess different funding streams, channelled through different agencies with different cultures, goals, and clients. There are many people and organisations each seeking a voice in the process. Policy can only be made by capturing the support and commitment of all those involved, and convincing them that this vision is in their best interest. Some people and systems will stand to lose in this process, and their opposition may slow down progress towards reform and improvement.

Conclusion

The United States faces challenges similar to those of other OECD countries regarding vocational and technical education and training. Across nations, public and private structures differ as they are the outcome of a unique historical development, but countries can gain from exploring what has and hasn't worked in specific contexts. The OECD, and the Phoenix seminar in particular, have provided a forum for the lively exchange of information on VOTEC systems, policies and practices. In the American case it has become clear that flexibility is key, and that policies cannot be formulated solely at the federal level of government but must be the product of a wider consensus that includes strong state, local government and business support.

Chapter 3

TECH PREP EDUCATION: AN AMERICAN INNOVATION LINKING HIGH SCHOOLS AND COMMUNITY COLLEGES

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1. The education and employment context

Because of intense global competition in the 1980s, the United States has now entered a period of transition in its education and training policies. A key feature of this transitionary phase has been the recognition of the interdependence of education, employment, and the economy. Since education and training are essential to the nation's economic and social well-being, the United States is beginning to pursue systemic change and reform in education and workforce preparation. For the first time in recent US history, education reform is focusing on all young people, especially those who do not plan to pursue a college education immediately after high school. Now all youth are recognised as essential to the nation's economic strength.

President Clinton's programme to stimulate American economic growth has emphasised the development of a technically competent, globally competitive workforce. One of the President's priorities is the School-to-Work initiative, an attempt to increase the quality of the diverse, decentralised vocational-technical education system in America. The School-to-Work Opportunities Act facilitates an array of innovative education-career paths that emphasise linkages between secondary and post-secondary education institutions, academic and occupational curricula (and instruction), and education and work (with work-based learning an essential component). Within the broader context of the School-to-Work initiative, tech prep education represents an important model, and is the principal education-career path highlighted in this chapter.

The American education system

The United States has a highly diverse and decentralised education system in which the 50 states are the primary agents. Over 25 per cent (67.5 million) of the people in the US are students or are employed by schools and colleges. Across the fifty states there are

approximately 15 400 school districts operating over 83 000 public elementary and secondary schools (kindergarten through grade 12) with 20 360 at the secondary level. Various arrangements for K-12 public school education are decided at the school district level. Elementary school may be grades K through 5 or K through 6. Middle school (or junior high school) may be grades 6 through 8; 7 and 8; or 7 through 9. High school may be grades 9 through 12 or 10 through 12. At the post-secondary level, there are approximately 3 500 colleges and universities, including about 1 100 public two-year institutions (National Center for Education Statistics, 1992*a*).

Compulsory school age is determined by each state. Full-time education is compulsory usually up to age 16, although it is expected that youth complete grade 12, usually at age 17 or 18, to receive their high school diploma. In the US, dropouts are persons who are not enrolled in school and are not high school graduates.

There were 46.2 million students enrolled in K-12 education in 1990. Of the total K-12 enrolment, 31.2 per cent of the students were minority: 15.7 per cent black, 11.2 per cent Hispanic, 4.3 per cent other. The high school dropout rate for all persons 16 to 24 years old actually fell from 15 per cent in 1970 to 12.1 per cent in 1990 – among whites from 13.2 per cent to 12 per cent; blacks from 27.9 per cent to 13.2 per cent. For Hispanic youth, the rate increased from 29.2 per cent in 1975 to 32.4 per cent in 1990 (National Center for Education Statistics, 1992*b*).

The VOTEC enterprise

The vocational-technical education (VOTEC) enterprise in the United States is large and diverse, encompassing both secondary and post-secondary education. Secondary VOTEC is offered primarily in comprehensive high schools and area vocational schools. The two-year public community and technical colleges are the primary post-secondary providers. Other providers include area VOTEC institutes, private proprietary schools and four-year degree-granting institutions. Work-based VOTEC is provided by partnerships between schools and employers, through structured work experience. Emerging models include co-operative education, youth apprenticeship, internships, and career academies. In the 1990 census of persons aged 18 through 34 who reported, 43 per cent took at least one VOTEC course offered by a two-year public college; 24 per cent by a private provider; 19 per cent by a VOTEC institute; 10 per cent by a four-year college and 5 per cent by an employer (National Center for Education Statistics, 1992*a*).

During their four years of high school, students earn their diplomas by successfully completing 20-24 Carnegie units (CUs) of course work. Students entering high school usually have a choice of three paths of study: *i)* the academic path for the college bound; *ii)* the VOTEC path for the work bound and; *iii)* the general path for the undecided, a loosely structured programme of study designed around personal interests.

Only the academic path has a national student exam, the Scholastic Aptitude Test, needed for admission to most four-year colleges. The VOTEC path prepares the student for entry level work or continuing occupationally specific preparation at the post-secondary level. The general path's survival is increasingly under threat, because it prepares students only for the high school diploma, rather than for meaningful jobs or post-

secondary training. Success in all three paths is based on satisfactory completion of courses that accrue the requisite number of CUs and culminate in the high school diploma. The VOTEC student going on to post-secondary occupational preparation can work toward a two-year associate degree, an occupational certificate, or (through transfer to four-year college) the baccalaureate degree.

Three new strategies are leading to significant reform of both the VOTEC and general paths:

i) the movement toward integrating academic and vocational curricula;
ii) tech prep education focusing on applied academics and the linking of secondary and post-secondary occupational curricula, and;
iii) the comprehensive menus of options suggested in the School-to-Work Opportunities Act.

Employment

Vocational-technical education in the United States is under increasing pressure to provide occupational preparation that addresses current and anticipated workforce needs. It is vital that education and employment should connect in this context. Knowledge of where new job opportunities may arise and where they are in decline will be an important part of workforce preparation and the development of occupational skills and competences.

In the US, wage and salary employment in manufacturing is projected to continue its decline from 19.1 million jobs in 1990 to 18.5 million in 2005, a loss of 600 000 jobs in the manufacturing sector. During 1975-1990, the share of manufacturing employment fell from 23.9 per cent to 17.5 per cent and is expected to continue downward to 14 per cent by 2005. Even so, productivity in manufacturing is projected to continue to increase (Carey and Frouklen, 1991).

Although the annual employment growth for 1990-2005 in all industries in the service producing sector is expected to be only half that of 1975-1990, almost all of the projected 24.6 million increase in wage and salaried jobs for 1990-2005 is expected to occur in this sector of the economy. Nearly half of the total growth projected for service occupations is expected in the services industry division (11.5 million jobs), with its two largest industries, health services and business services accounting for one-fourth (6.1 million jobs) of the growth. Sixteen of the 20 fastest growing industries and 12 of the 20 industries adding the most jobs are within the services industry division. Most of these industries are in business, health, social, legal, engineering, management and education services (Silvestri and Lukasiewicz, 1991).

The Bureau of Labor Statistics provides an analysis of the 30 fastest growth occupations, the 30 largest numerical growth occupations, the level of education required for both and the 30 largest declining occupations. Fastest growth occupations account for 22 per cent of projected overall growth in employment; largest growth occupations account for 50 per cent of projected overall growth. More than two-thirds of the 30 fastest growth occupations and nearly half of the 30 largest growth occupations in 1990 had a

majority of workers with education and training beyond high school. More than half of the 30 largest declining occupations are concentrated in manufacturing. Key factors contributing to those declines are reduced defence expenditures, increased imports and advanced technology resulting in higher levels of production. Two overriding factors affecting change in occupational employment are shifts in employment among industries and changes in the occupational structures of industries (Silvestri and Lukasiewicz, 1991).

2. The tech prep movement

Tech prep education defined

Tech prep education is one of the most significant innovations in the education reform movement in the United States. It provides an alternative education-career path intended to prepare students for high-skilled technical occupations. By formally linking secondary and post-secondary academic and occupational curricula, it provides the basis for major structural change in the education process. Tech prep education is geared towards direct entry into the workplace as a qualified technician or continuation with further education leading to college and advanced degrees.

Tech prep education is designed as a programme of study available to all secondary students, including those in college preparation, vocational-technical, or general education paths. It also serves those who are economically disadvantaged, disabled, part of a minority, have limited English proficiency, or have dropped out of school.

A bona fide tech prep education programme has three basic characteristics. The programme links in a seamless path the student's transition from high school to, usually, a two-year community or technical college. It is based on a planned sequence of study for a technical field beginning no later than the eleventh year in high school and completing with at least one year of post-secondary education. And, it requires a formal and programme-specific articulation agreement between the secondary and post-secondary institutions involved to prepare students for careers in technical fields.

Models of tech prep

There is more than one approach to tech prep education. The variation in models for tech prep is based primarily on the nature of the secondary-post-secondary linkage arrangement. It entails both vertical and horizontal integration. The five models described below represent the most common approaches currently being implemented.

2 + 2: The last two years of high school with two years of post-secondary education, usually leading to an associate degree or occupational certificate.

4 + 2:	Four years of secondary school that include two years of pre-tech prep preparation and the last two years of high school with two years of post-secondary occupationally specific education, typically leading to an associate degree.
2 + 2 + 2:	The last two years of high school with two years of post-secondary technical education followed by two years of higher education culminating in a four-year baccalaureate degree.
2 + 1:	The last two years of high school with one year of post-secondary occupationally specific education culminating in an occupational certificate.
2 + Apprenticeship:	The last two years of high school with at least two years of apprenticeship training leading to a certificate.

Influence of federal legislation

The development of tech prep programmes throughout the United States was given major impetus by the enactment of the Carl D. Perkins Vocational and Applied Technology Education Act (Perkins) in 1990. Tech prep education is a cornerstone of the Perkins Act. The most widely applied tech prep education programme is the 2 + 2 approach, stimulated largely by Perkins which also encourages implementation of the 2 + Apprenticeship model. Tech prep education is addressed in Perkins under Titles II and III: Title II defines the state eligibility requirements for tech prep funds, and Title III spells out the Congressional design for tech prep.

Through Perkins each state is awarded a Basic State Grant with multiple uses of funds allowable under Title II. In this section of Perkins, states are given authority to use federal funds for tech prep programmes providing they meet three requirements. They must be of sufficient scale and quality to be effective; academic and vocational education must be integrated through a coherent sequence of courses, and provision must be made for special populations to participate equitably.

Tech prep receives major emphasis in Perkins under Title III, where it is referred to as the "Tech Prep Education Act". In this section of Perkins, all states are allocated funds to develop and implement local tech prep programmes as specified in the Act. Following significant increases in funding during the first two years of tech prep, by 1993-94 states received $104 million for implementing tech prep. This means each state received on the average about $2 million.

The Tech Prep Education Act has two stated purposes:

- to provide planning and demonstration grants to consortia of local education agencies and post-secondary educational institutions, for the development and operation of 4-year programmes designed to provide a tech prep programme leading to a 2-year associate degree or a 2-year certificate;
- to provide in a systematic manner, strong, comprehensive links between secondary schools and post-secondary educational institutions.

The Tech Prep Education Act (Title III, Part E) is prescriptive and quite specific as to the type of tech prep programme that is to be developed. The law specifies that the tech prep programme provides preparation in at least one of the following fields: engineering technology; applied science; mechanical, industrial or practical art or trade; agriculture; health; and business. In addition, the tech prep education programme is expected to build student competence through a sequential course of study in math, science, and communication which may be obtained through applied academics. The integration of academics into the tech prep curriculum is a basic assumption.

According to the Act, the tech prep education programme *must have* the following seven elements:

- an articulation agreement between the high schools and community colleges involved, as well as the other partners in the tech prep consortium;
- a 2 + 2 design with a common core of proficiency in math, science, communication and technology;
- a specifically developed tech prep curriculum appropriate to the needs of consortium partners;
- joint in-service training of secondary and post-secondary instructors to effectively implement the tech prep curriculum;
- training programmes for counsellors to recruit students, ensure programme completion and subsequent appropriate employment;
- equal access of special populations to the full range of tech prep programmes;
- preparatory services such as recruitment, career and personal counselling, and occupational assessment.

Although Perkins encourages tech prep programmes to connect with employers and labour and with four-year baccalaureate programmes, those connections are not required. However, states are to give priority consideration to tech prep programmes that offer effective employment placement, transfer to 4-year baccalaureate programmes, dropout prevention, and services to special populations. Perkins also directs states to develop their tech prep programmes in consultation with business, industry and labour.

Implementation of tech prep programmes

With the stimulus provided by Perkins, it is estimated that nation-wide over 1 000 tech prep programmes are being implemented involving approximately 100 000 students. According to a survey conducted by the National Center for Research in Vocational Education (NCRVE), most states are building their programmes on related past experience (Bragg, 1992). For example, twenty-one states had prior experience with articulation agreements, at least eleven had operated 2 + 2 type programmes, and nine had some tech prep experience. It is also worth noting that at least six states have connected their tech prep efforts to another major federal law, the Job Training Partnership Act (JTPA), administered by the US Department of Labor. Where apprenticeship is concerned, at this stage of development, the linkage to tech prep is minimal.

States making the greatest progress in tech prep implementation thus far include Illinois, Maryland, Oklahoma, Oregon and Texas. From early experience in the field, it appears that successful tech prep programmes in these states tend to possess eight important characteristics. These include enthusiasm for tech prep among the actors and localities involved, effective collaboration between secondary and post-secondary consortia members, and an extensive marketing and outreach strategy used to attract students and inform instructors and parents about tech prep. Successful programmes also devote significant time and attention to developing the tech prep programme's philosophy and vision, designing curriculum specifically for tech prep, and integrating academic and technical knowledge and skills. They also tend to involve everyone effectively in the process: teachers, counsellors, and administrators receive ongoing professional development in tech prep and teamwork, employers are actively involved, and key state and local officials are supportive of tech prep.

Three tech prep education programmes, recognised by the US Department of Education through its "Excellence in Tech Prep Award", illustrate quality tech prep programmes that work.

Partnership for Academic and Career Education Consortium (PACE), Pendleton, South Carolina

The purpose of PACE is to prepare students for careers in mid-level technologies beginning in the ninth grade and ending with the completion of a post-secondary certificate, diploma, or associate degree. It is designed to provide students a seamless pathway between the secondary and post-secondary levels of education. It was established in response to concerns of local business and education leaders that too many students were dropping out of area high schools or graduating without adequate preparation for post-secondary education or employment. PACE was established in 1987 as a business and education consortium. Its partners include seven school districts, Tri-county Technical College, the National Dropout Prevention Center at Clemson University, and local businesses and industries. The PACE tech prep programme links high school and two-year college programmes to provide academic and vocational preparation for mid-level technology careers in industrial/engineering technology, business, health and public services fields. PACE works with each participating school district in restructuring curricula and designing modules in applied mathematics, English and science courses. Employer participation in PACE has enabled the development of networks, mechanisms, and materials to facilitate the tripartite linkage between secondary and post-secondary education and employers.

Portland Area Vocational Technical Education Consortium (PAVTEC), Portland, Oregon

PAVTEC was established in 1986 after three years of planning to establish a regional 2 + 2 tech prep programme. PAVTEC unites Portland Community College and 12 school districts, including 26 high schools within five counties, into a working partnership. The partnership also includes private industry, labour, and other educational organisations. The PAVTEC tech prep programme prepares students for careers in avia-

tion maintenance technology, software engineering technology, medical technology and other technical fields. In addition to regular participation in strategic planning and in curriculum development and revision, industry has provided summer internships for vocational-technical teachers, counsellors, students and administrators in PAVTEC. During the school year, students are provided work-based learning opportunities through co-operative education.

Quad-County Tech Prep Consortium, Fort Pierce, Florida

The Quad-County Tech Prep Consortium was established in 1991 in direct response to Perkins. The purpose of the Consortium is to organise and deliver tech prep opportunities to students who rank in the middle 60 per cent of their classes and have not yet defined specific career goals. The Consortium partnership is made up of Indian River Community College and all eight high schools of four surrounding local school districts comprised of the four-quad counties of Indian River, Martin, Okeechobee and St. Lucie. Over 200 local business and industry partners are represented in the Consortium by the Private Industry Council operating in this rural area. The 4 + 2 model being implemented involves tech prep curricula in four major cluster areas – agribusiness, health, business management and industrial technology – that culminate in an associate degree or technical certificate. Integration of academic and technical skills is central to the tech prep curriculum design. These curricula have been adopted as the curriculum standard for tech prep by the State of Florida. In addition to being involved in curriculum development, business and industry have been heavily involved in staff development. One of the workshops offered is a technical writing workshop for tech prep English and business instructors focusing on writing expectations employers have of employees in a wide range of occupations, from clerks to engineers. During the first year of implementation, 3 400 students were enrolled in tech prep.

3. Concerns and challenges

Even in the short time following tech prep's introduction at the federal level in the Perkins legislation, some of its shortcomings have already become apparent. They centre around the roles and relationships of the social partners (especially employers), the narrow four-year span of the programme, and the difficulties of creating and sustaining quality tech prep programmes. Some of these problems will be dealt with by the School-to-Work Opportunities Act, but others are continuing concerns.

In addition to the concerns about the structure and functioning of tech prep, the federal government itself faces political and logistical challenges in supporting and developing tech prep. It must forge working relationships across executive departments, develop its information and technical assistance capacities, co-ordinate a diverse set of legislative initiatives, and strike a balance between serving disadvantaged young people and the mainstream.

Some of these concerns and challenges are nearly universal experiences for nations undertaking VOTEC reform, but some of them are peculiar to the highly decentralised

and politicked nature of American education. But as in every OECD nation, the bottom line in tech prep and VOTEC reform is results: whether the reform achieves the educational and economic objectives that American policy makers desire.

Concerns

Even though the localities are responding to tech prep education with great enthusiasm, quality tech prep programmes require them to invest significant amounts of time in design and implementation. It is very important that tech prep consortium members, the local providers, fully understand the nature of tech prep education and its critical components. Some concerns have already appeared during the development and implementation of tech prep programmes that will require all participants' continuing attention. These problems include:

Narrow consortium membership

The Perkins Act emphasised the formation of tech prep consortia made up of public schools and community (or technical) colleges. Early experience has shown, though, that programme success depends on the "buy-in" among a wider set of participants: counsellors, employers, and four-year baccalaureate degree-granting institutions. As tech prep evolves, it is important that the membership reflect the employment and higher education components of the programme. The involvement of two-year colleges has emerged as a critical condition for parents and students to consider tech prep. The upward mobility promised by a programme with a post-secondary option seems to be one of tech prep's greatest features. Observers have also pointed to the importance of well-trained career counsellors in tech prep programmes. These counsellors need specialised training to help them become knowledgeable about non-baccalaureate options and to let them work effectively with employers in placing and supporting students at work sites.

Nominal involvement of employers

Though essential to the success of tech prep, employer involvement in consortia has proved to be elusive. Employers need to be involved in curriculum development, the provision of work experience, and ultimately, in the hiring of tech prep completers. The most successful tech prep programmes have strong employer involvement, and local consortia face a serious challenge in strengthening and sustaining their participation.

Absence of four-year college and university involvement

The four-year and advanced degree institutions also have a role to play. They serve tech prep in two ways: *i)* in the provision of in-service training for both tech prep instructors and counsellors; and *ii)* in building the 2 + 2 + 2 option for tech prep students.

Absence of pre-tech prep

Earlier preparation that goes beyond the preparatory services offered is needed for many students to qualify for entry into tech prep programmes. States are being encouraged to use Basic State Grant funds to prepare students in the earlier grades. Many states are investing their own funds for pre-tech preparation.

Perception of exclusivity

Tech prep is not a programme intended for only academically high-performing students. That perception contributes to inhibiting access and participation by economically disadvantaged and other special populations. Preliminary preparation of students for entry into tech prep should be available to all who are interested in entering a tech prep programme.

Superficial articulation agreements

The tech prep programme is not automatically established by an articulation agreement. To get tech prep established quickly, some localities have been tempted to plug in existing secondary and post-secondary courses into the tech prep framework, without integrating the curriculum or changing the mode of instruction. The success of a programme relies on a strong, participatory and ongoing relationship of mutual benefit and interdependency between both secondary and post-secondary actors from initial planning through placement. The articulation agreement should ensure a seamless bridge between the secondary and post-secondary tech prep curriculum.

Unfortunately, in some consortia, secondary and post-secondary institutions have been suspicious of each other. Some high school staff do not trust the community colleges because they feel the colleges look to universities rather than high schools in making curricular decisions. High schools are sometimes afraid that community college involvement in the consortium will be heavy-handed and oblivious of high school needs. On the other hand, some community colleges have been critical of high schools for not preparing tech prep students adequately for college-level work, and some have seen tech prep as an intrusion into the way they prepare students for technical occupations. In addition, secondary and post-secondary institutions have criticised each other for seeing tech prep as a federal money spigot, rather than as a path to programme improvement.

Inadequately designed tech prep curriculum

The tech prep curriculum is not merely a conglomeration of courses. It should be carefully and jointly planned with each course tailored to the specific programme of study. The curriculum should provide a seamless transition from secondary to post-secondary instruction. It is the epitome of academic and technical curriculum integration. Tech prep requires higher performance standards than the programmes it replaces. Consortium members must work together to reconcile competences and course credits. Programme evaluation needs to be ongoing at the local level.

Challenges

As a leading innovation in the preparation of a technically competent, globally competitive workforce, tech prep education poses many challenges that demand systemic and structural change in American education and training. Tech prep requires breaking out of traditional approaches with new thinking, new alliances and new designs.

In the past few years, it has become clear that the federal government has an important catalytic role to play in helping these changes to take place. In that regard the government faces a set of challenges in implementing and sustaining tech prep that must be addressed now and in future education policy initiatives. These challenges include: forging working relationships across executive departments, develop its information and technical assistance capacities, co-ordinating a diverse set of legislative initiatives, and striking a balance between serving disadvantaged young people and the mainstream.

Public awareness and marketing

The government has a responsibility for helping to make information about tech prep widely available. Tech prep is new. Parents, employers, and colleagues need to be informed about it. Students need to be encouraged to consider it as an interesting, worthwhile educational option.

Professional development

Training is an essential component of a quality tech prep programme, and national conferences on tech prep are already drawing thousands of practitioners. Both secondary and post-secondary instructors and counsellors of tech prep need in-service training on how it works and how to make it work. For much of that training they need to be together. The Perkins Act has left much of the decision-making on staff training up to the states, but there may well be a growing role for federally-provided technical assistance.

Communication and co-ordination

Tech prep requires co-ordination, co-operation, and collaboration with all key players. It involves breaking down the traditional barriers between levels of education, between academic and occupational education, and between education and employers. The federal government must demonstrate leadership in this area, that includes forging effective links between the Departments of Labor and Education.

The School-to-Work initiative marks the first time such interdepartmental co-ordination has been worked out at the federal level, and much has already been learned. Both departments initially felt responsible for School-to-Work, and both had misconceptions about co-operation. Education felt Labor did not always understand the structure of education, and the severe problems posed by the decentralised system and atomised decision making. The vast number of education players, including higher education administrators and boards, high school administrators and school boards, pose familiar problems at the Department of Education. The resulting lack of consensus and competing

interests challenged the Department of Labor staff who were more used to a centralised training administration.

Equally confusing to the Department of Education was the expected role of the Department of Labor in understanding the employer community. Early experience in co-ordination demonstrated that no government department fully grasped the attitude of employers about school-to-work programmes. Employers do want to be involved, though most do not know much about education, and do not know how to become involved. Many are looking for guidance from the government, but not control or regulation. Tech prep cannot work without the sanction, support, and participation of employers. This also means that tech prep programmes need to address existing labour market demands.

Quality assurance

The federal government has a delicate but vital role in encouraging the setting of high standards in tech prep. Because tech prep is sometimes viewed as a panacea to the nation's education and training problem, there has been a surge to implement it. Success will rest on strong and effective programmes, however, and programme standards will be a continuing federal concern. The federal government has also become involved in convening and co-ordinating the setting of industry-based skill standards: currently, at least 22 industry-based skill standards projects are being supported between the Departments of Education and Labor, and all are different.

The bottom line

The ultimate success of tech prep will be determined by its results. The criteria for success will include the attainment of a certificate or Associate Degree, and the successful placement of the tech prep programme completer in a technical occupation (or successful transfer to a baccalaureate degree programme). Another critical determinant of success will be the satisfaction of the programme completer, the employer, and the university recruiter with the tech prep programme.

Tech prep education is breaking new ground by providing new and effective approaches to the education of a quality workforce. Tech prep stimulates new organisational and programme arrangements. It demands a level of co-operation and collaboration that can only be accomplished through effective teamwork. Most importantly, tech prep education provides a highly desirable educational pathway for American youth, while at the same time enhancing the nation's economic well-being.

4. The future: tech prep and the school-to-work opportunities act

The School-to-Work Opportunities Act of 1994 represents the next phase of the federal government's attention to tech prep and other school-to-work programmes beyond the narrower focus of tech prep. The School-to-Work Opportunities Act concentrates on systemic innovation and change. It emphasises the importance of all the social partners as

"players at the table", including secondary and post-secondary education, public and private sector employers, labour and trade unions, community organisations and others. They must come to a consensus on new collaborative approaches and structures that enhance workforce preparation in the United States.

Compared to the Perkins Act, the new School-to-Work Opportunities Act will serve all students. It extends the scope of school-to-work activities beyond grades 11-12 and two year colleges, to include younger and older students. It also allows greater local flexibility in decisions about how federal funds may be used in providing school-to-work services. Tech prep education, including a work-based learning component, is one of the core school-to-work strategies identified. Tech prep providers should be key players in developing a menu of school-to-work services to young people.

The School-to-Work Opportunities Act also deals more explicitly with employer involvement than Perkins has. In the new Act, employers are expected to provide work-based learning opportunities, although they are not required to do so by legislation. The problem of having available a sufficient number of work-based learning experiences for participating students is particularly challenging. The most successful local tech prep programmes already have extensive employer involvement in the consortium, in developing the curriculum, providing work-based learning experiences, and then ultimately employing tech prep completers.

Finally, the School-to-Work Opportunities Act, in conjunction with the Goals 2000: Educate America Act expands the federal government's involvement in setting standards. The Perkins Act's principal emphasis was on programme standards, rather than outcome standards, industry standards, or the system of voluntary education and skills standards expressed in Goals 2000. Passed in 1994, the Goals 2000: Educate America Act encompasses the Clinton Administration's comprehensive effort to restore the quality of education through a system of voluntary education and skills standards. This Act establishes a National Skills Standards Board to oversee the development and implementation of a national voluntary system of industry-driven skill standards. Impetus for the introduction of skills standards and outcome measures into school-to-work programmes depends on the integration of these different pieces of legislation.

The School-to-Work Opportunities Act highlights the importance of linkages between and integration of academic and vocational education, secondary and post-secondary education, school-based learning and work-based learning, education and employers and local, state and federal agencies. Tech prep education exemplifies what is required of a systemic approach to school-to-work transition, and should continue to provide a valuable contribution to America's preparation of young people for work.

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Chapter 4

COMPULSORY EDUCATION AND WHAT THEN? SIGNALS, CHOICES, PATHWAYS

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For students, the most important linkages of secondary and post-secondary education, training and the labour market are the pathways that connect them. These pathways lead from compulsory education and various sociological "starting points" to destinations in the labour market and/or higher education. This chapter discusses the implications of these pathways for vocational and technical education and training (VOTEC).

Section 1 outlines the general perspective of the chapter, which develops the "educational pathways" aspect of the book's linkages theme. This perspective sees education as a system of differentiated yet interconnected pathways; the task of the policy maker is to construct or modify these pathways in a way to encourage young people to make the desired journeys along them. The first section, therefore, discusses the instrumental orientation of young people to education, to which this perspective responds, and lists several general constraints upon policy. Section 2 is less abstract. It describes six current trends or policy problems in OECD countries, and some of the main responses, as identified through the pathways perspective. (The argument of section two is summarised in Figure 1.) Section 3 draws on these discussions to introduce seven policy issues affecting VOTEC, which are presented in the form of questions to the reader.

1. The "pathways perspective": an overview influencing choices

The end of compulsory schooling is, by definition, a time of choice. Students choose (and keep choosing) whether to continue education or drop out. If they continue, they choose among different lines or options – an area of choice that may be increased by student-centered or market-led philosophies of education. Once on their post-compulsory programmes, they exercise a more subtle but equally important type of choice: the choice of how hard to work, of what level of attainment to aim for, and of priorities between

Figure 1

The construction of pathways: current trends, problems and responses

Trends and problems	*Responses*
• More diverse origins (student backgrounds)	• more diversity • more flexible pathways
• Problem groups: students who fail the system (or whom the system fails)	• tighter links between VOTEC and unemployment
• More uncertain destinations (labour market trends)	• weaker/more flexible links VOTEC and occupation
• Mismatches between education and occupation	• weaker/more flexible differentiation of pathways • new balance between initial and continuing VOTEC • use of market forces to balance supply and demand • decentralisation
The status of VOTEC	• weaker/more flexible boundaries between VOTEC and academic or general education • VOTEC pathways to higher education • more exclusiveness within VOTEC
Social objectives	• weaker/more flexible differentiation of pathways • relative insulation from labour market • tighter links between VOTEC and employment

education and other claims on their time and energy. Many problems of VOTEC in OECD countries arise, at least in the first instance, from the ways in which students make these choices. These include problems of low participation or high drop-out rates, poor correspondence between young people's choices and the supply of education or jobs, and the low motivation and attainment of particular groups of students, especially those with other social and labour market disadvantages. Further problems arise from the failure of the "right" kinds of students to choose particular options – for example when particular courses (or VOTEC in general) do not attract enough students of the right calibre to meet economic or social needs.

This chapter discusses how education policy can respond to student choice and to problems of this kind. This involves deciding how to appeal to the aspirations and instrumentalism of young people. The policy aim is to provide the balance of incentives that will elicit the choices and behaviours from students that result in the aggregate level and distribution of educational participation desired by policy makers. In this perspective, education systems consist primarily of differentiated opportunity sets and pathways, through which students may choose a variety of possible routes, each leading to different educational and labour market opportunities.

For convenience this approach is labelled the "pathways perspective". It is concerned with the construction of roads or pathways through education and training and into the labour market. These pathways include highways and by-ways, freeways and toll-roads; they may intersect, with junctions, cross-roads and U-turns. Some pathways are easier and more pleasant to travel along than others. Some may be one-way streets. The analogy with pathways (or road systems) should not, however, be pushed too far. Educational pathways are constructed, not only so that travellers can reach destinations upon which they have already decided, but to encourage them to go to different destinations as well. Real roads are clearly distinguished from destinations and travellers pull off the road when they arrive. In an education system, all destinations are potential pathways to somewhere else. We are always travelling.

In contrast to Senta Raizen's chapter in this volume, the pathways perspective emphasises extrinsic rather than intrinsic incentives to learning. This is not to suggest that the two types of incentives are always clearly distinguishable, but there is a difference of emphasis. Typically, the pathways perspective is less concerned with the conditions for effective learning of students on a course, than with how they came to be on the course in the first place. It is less concerned with learning in order to perform a job effectively, than with learning in order to get a job.

The pathways perspective is implicit in the policies of most OECD countries, and in several OECD reports. But it lacks a distinctive research or policy literature, of the kind one finds associated with more documented approaches such as manpower planning or human capital. It also lacks a recognised set of organised principles or axioms. The remainder of this section outlines a few such principles.

Appealing to the aspirations and instrumentalism of young people

Young people's orientations to education, and especially to VOTEC, are predominantly instrumental. The principal expectation which most young people (and their parents) have of education is that it will help them to get a good and well-paid job. In this respect their purposes for education tend to be different from those of teachers and educational planners. Young people's decisions to participate in post-compulsory education are strongly influenced by the economic and social benefits that are expected to flow from their participation. Such instrumental attitudes are found not only among successful and highly motivated students, but also – and perhaps especially – among those who are unsuccessful and appear to have rejected education. They may reject it precisely because the perceived instrumental pay-off is inadequate. For example, dropping out at 16 is a

rational course of action for many British students because there may be more labour market opportunities for 16-year-olds than for older school leavers (Roberts *et al.*, 1989).[1] Dropping out may also be rational for some North Americans; even if it is not, as a recent Canadian study demonstrated, dropouts may remain instrumentally motivated to achieve the equivalent goals by other means (Rumberger, 1987).

The policy task is therefore to construct pathways through the education system in such a way that young people's instrumental choices reproduce those desired by the policy maker. While instrumental or extrinsic factors have powerful effects, intrinsic factors may also be important. Young people may choose particular pathways because they enjoy the journey, not just because of the destinations to which they lead. They may be interested in the subject, or they may like the style of learning and teaching. Senta Raizen's chapter discusses how the context of learning can motivate the learner. But in practice, intrinsic motivation is often difficult to separate from extrinsic (or instrumental) motivation. Students may be motivated by the occupational relevance of a course or by the opportunity to gain an occupational identity but neither the relevance nor the promised identity is likely to motivate students who do not believe their course is leading them to the occupation concerned.

While young people's approaches to education are generally instrumental, their longer-term goals and values are typically conventional. To a large extent they share the values and perspectives of their parents. A 1983 review found no evidence of widespread rejection either of education or of traditional employment norms by young people in OECD countries (OECD, 1983; on rising aspirations see Adamski and Grootings, 1989). The work ethic – or more accurately, the employment ethic – was still strong, even if young people were capable of discriminating among particular jobs. Even among the disadvantaged groups and the unemployed, few young people rejected the norms and values of employment.

In addition young people tended to agree about the types of occupations that they most wanted. This agreement has increased. Industrialisation and social change have raised aspirations over the last few decades. Not only are aspirations higher, but in many countries they are more uniformly high. To a greater extent than previously, young people all tend to want the same thing.

Responding to differences among young people

One implication of this argument is that differences among young people's choices are as likely to reflect their different opportunities or resources as their different values. This applies to differences between countries as well as within them. For example, the relative failure of English education and training, and the relative success of the German system, are often attributed to cultural values and attitudes which influence the choices of young people in each country. German youths attach more importance to qualifications than their English counterparts, even if the latter show more "can-do" optimism about their economic prospects (Bynner, 1990). While these differences may reflect national cultures, they also reflect the different opportunities for young people in the two countries. Qualifications are a more important condition for advancement in Germany than in

England. Cultures and subcultures may simply mediate the effects of opportunity structures.

In the United States, ethnic and racial minorities are disproportionately represented among those who drop out from high school. In England and Wales, however, members of minority groups, who experience levels of social disadvantage similar to their American counterparts, are more likely than other young people to continue in full-time post-compulsory education (Rumberger 1987; Gray *et al.*, 1990). The likely explanation for this paradox is not (primarily) that members of English and Welsh minority groups attach greater value to education; it is rather that they find it harder to gain entry to apprenticeships and other sought-after jobs which tend to recruit white males through informal networks, and they remain in education instead. In other words, different choices may arise less from differences in underlying values and preferences than from differences in resources and opportunities.

In all countries, young people's choices, aspirations and attainments vary in relation to their abilities, socio-economic status, ethnic or racial affiliations and gender. To a large and perhaps increasing extent, these variations reflect the different resources and opportunities available to young people, rather than differences in more fundamental values. The different choices of males and females may appear an exception to this, and in part they undoubtedly reflect deeply rooted values and socialisation. But in many countries there has been a convergence between the career expectations of males and females (Burnhill and McPherson, 1984). And when young people continue to make traditional gendered occupational choices this may partly reflect the actual opportunities in the labour market or the social and personal costs of working in cross-gendered occupations.

Constraint No. 1: the zero-sum problem

The construction of pathways is subject to at least four general constraints. The first arises from the nature of education as a positional good. In the pathways perspective young people's participation is secured through incentives, the most important of which are related to the labour market – to jobs, income and career prospects. But at least in the short term, the available labour market incentives are fixed; the educational policy process therefore resembles a zero-sum game in which an improved incentive in one part of the system must be matched by reduced incentives elsewhere. A system may increase the number of educational incentives (such as qualifications) that are offered, but it may find that the exchange value of these incentives in the labour market has been devalued as a result.

The ambitious French attempt to increase the number of students achieving the *baccalauréat* may be a test case of these pressures, and of how they might be avoided.[2] It is likely to result in at least one of the following outcomes: a devaluation of the "market value" of the *baccalauréat* increased status differences between different types of *baccalauréat* or increased differentiation within post-secondary education. Already it seems likely that much of the expansion will be achieved by students pursuing the academic *baccalauréat*, rather than the vocational *baccalauréat* intended.

The pressures towards hierarchy in education systems impinge most heavily on low-attaining and disadvantaged students. "Qualifications inflation" affects them too. The smaller the minority of students who leave education without qualifications, the worse their relative position. Education must always balance the desire to set attainable standards for these students against the desire to maintain the exchange value of the awards. Standards which are easily attainable (like the lowest level of National Vocational Qualification in the United Kingdom) may have little value in the labour market.

The "zero-sum" problem may also obstruct diagnosis of education problems. A popular figure in education mythology is the innumerate politician who criticises schools because half their students are achieving below the average. It may be equally wrong to criticise schools for failing to meet the needs of various "problem" groups; the problems of these groups may be positional and have to do with their relative rather than their absolute achievement. This argument should not be exaggerated – there are absolute levels of attainment (basic literacy, numeracy and so on) which all students should meet. But it does raise the question of why education systems are often perceived to be failing only the low-attaining (positionally disadvantaged) students. In many countries the more "successful" students may be at least as badly served by the system, but this failure is obscured by their positional advantage.

A further consequence of the "zero-sum" problem is that distributional issues lie at the heart of any debate about educational pathways. If improved incentives in one part of the system can only be achieved by reducing incentives elsewhere, then educational policy faces a chronic conflict of priorities. One of the most pressing problems perceived by policy makers is the need to raise the status of VOTEC. But if status is defined in relative terms, is this a realistic goal? If the status of VOTEC is to be raised, must this not be balanced by a reduction of status elsewhere? For example, there is a conflict between attempting to raise the status of VOTEC – typically by making it or its upper streams more exclusive – and attempting to cater for disadvantaged groups, typically by making VOTEC more inclusive. The "inclusive" British Workforce reflected strategic priorities very different to those of France, Germany or the Netherlands, where regular VOTEC remained clearly separate from schemes for unemployed or disadvantaged youth. And in Germany it is now suggested that the dual system itself be divided in order to enhance the status of its upper stream.

A possible basis for classifying education systems is the way they handle these distributional issues. Imagine a status hierarchy, ranging from zero to the 100th percentile. Using this, we can classify each country according to where on this continuum the boundary between the general and VOTEC tracks lies. The internal boundaries within VOTEC, for example, between technical and vocational streams, could also be specified. (The boundaries may depend on the age of the young people concerned.) Countries' policy priorities can be similarly classified. Most countries give highest priority to the top quartile of students, but some give next highest priority to the second quartile (France), others to the third quartile (Germany) and others to the bottom quartile (the United Kingdom – and possibly the United States, in future). Some of the issues involved in these different approaches are discussed in section three of this chapter.

Constraint No. 2: labour market recruitment and training

The "zero-sum" constraint arises from the inability of education policy makers to influence the total level of the available labour market incentives. A further constraint arises from their frequent inability to influence the way these incentives are distributed in relation to participation and attainment in education. Except where occupational entry is legally regulated on the basis of qualifications, education authorities may have little control over the way that educational criteria are used in the labour market selection process and over the resulting "market signals" conveyed to future students.

These market signals may display a number of biases. One frequent bias is "conservative credentialism": employers prefer students from high status courses simply because such courses are assumed to have attracted the "best" students with high potential in the first place. This occurs to the extent that employers are looking for young workers with high general potential rather than with more specific competences: typically in labour markets dominated by internal markets rather than by occupational markets. The effect of conservative credentialism is to create market signals in favour of high status courses such as those which are typically those favoured by higher education. This tends to reinforce existing status hierarchies within education and makes changes such as an increase in the status of VOTEC difficult to achieve. For example, the Technical and Vocational Education Initiative (TVEI) sought to enhance the technical and vocational content of general education in the United Kingdom; but its Scottish evaluation found that employers who strongly approved of the aims of TVEI nevertheless used traditional qualifications, not TVEI, as criteria for selecting their own young workers (Bell *et al.*, 1988). The corollary of conservative credentialism is stigmatisation: programmes designed to give dropouts or disadvantaged students a second chance – such as the KMBO (short senior-secondary full-time vocational) programmes in the Netherlands – may fail to gain acceptance in the labour market (Meiers, 1990).

Market signals are also influenced by employers' conservatism, by their lack of information about education developments, particularly at a time of rapid change, or by their use of "information networks" for recruitment. This favours VOTEC programmes which give young people access to such networks, for example through work experience placements or work-based units. Employers' age preferences in recruitment also influence student choices, encouraging students to exit from full-time education at the earliest opportunity when younger recruits are preferred, or vice versa.

Employers are important providers of training and of key components of VOTEC such as work experience. Here too their activities cannot easily be controlled by education authorities. When the work-based training system known as EFG was introduced in Denmark it had difficulty in obtaining sufficient work placements.[3] This problem was not so obvious in Italy and the United Kingdom, but in these countries employers were criticised for using training schemes as "cheap labour" and neglecting their educational components (CEREQ, 1990).[4]

Workers can influence pathways, as well as employers. They have a strong interest in VOTEC's role as a gatekeeper for occupations. The different roles and power of trade

unions account for wide variations in the level and organisation of VOTEC across countries (Marsden and Ryan, 1991).

Constraint No. 3: institutional inertia

It is not only the labour market that can be difficult for educational authorities to control. Educational institutions may also resist attempts to restructure them or to plan new pathways through them. Vested interests and expectations are slow to change. Informal hierarchies and inequalities persist even if they are formally abolished. A report on the Italian school system noted an: "increasing gap between two levels; on one hand the institutional level with the academic norms and the political-legislative discussion underway on those norms, and on the other hand the level of the real processes concerning actual behaviour and the evolution of the system's so-called 'periphery'. In fact, what we have is a growing divergence between the 'ought to be' as represented by the laws, circular letters and contracts, the appearance or the image public opinion has of the school and the daily reality lived by each school (...). This divergence makes it extremely difficult to govern the school system in all its various facets" (CENSIS, 1989).

Policy is made, at least in the first instance, in relation to the "ought-to-be" level; but pathways are created at the level of "daily reality". For example in Italy, despite their formal equality of access to a university, "secondary school graduates with a diploma in humanities have a 50% probability of finishing university studies, [but] first year students from technical secondary schools or institutes only have a 10% probability" (CENSIS, 1989 pp. 66-67).

Similar tension exists in Scotland, where since 1984 most vocational education has been provided through a national system of modules, which may be studied in a variety of institutions, and by different modes of study. In principle the modular system provides much greater choice and flexibility in respect of student pathways and makes institutional differences (between school and college, full-time and part-time study, and so on) less important. In practice, however, this "intrinsic logic" of modularization has proved weaker than the "institutional logic" which has conventionally influenced pathways through and between different institutional statuses (Raffe, 1988). Selectors in employment and higher education have continued to take account of institutional factors, such as the period or mode of study and the institution attended, which are supposed to be irrelevant in the new modular system. And modularization has not greatly changed young people's pathways into and within the labour market – which have never depended strongly on vocational qualifications.

Constraint No. 4: learning

The fourth constraint is perhaps the most obvious. Pathways must enable the students who travel along them to acquire the knowledge and competences required at their destinations, whether these are jobs or higher education. The pathways must be long enough, and they must cover the appropriate territory. They must take account of changing skill demands and of the ways that tasks and skills are combined within occupations.

This constraint may limit the flexibility of pathways. If students transfer to a different pathway they must make up for the learning that they missed because they did not join that pathway earlier.

Further constraints are imposed if occupational practice as well as more formal teaching is required for effective learning. One way to meet this requirement is to provide the relevant VOTEC to young workers after they have been selected for their jobs – with clear implications for "pathways". However there are other ways to organise the integration of formal and practical learning in VOTEC, as discussed in Chapter 5. A more subtle constraint arises if occupational socialisation is a central principle of the VOTEC curriculum. This typically requires relatively stable and homogeneous groups of students, all of whom aspire to enter the occupation in question. These conditions are harder to satisfy in systems with more flexible pathways, in which the composition of student groups varies across modules or course units, and where students studying a particular unit have more varied backgrounds and aspirations.

Curricular constraints of this kind are often mentioned in education debates, but they may be used by vested interests to justify restrictions on pathways. For example, programmes may be artificially prolonged or entrance requirements kept unnecessarily high to raise the status of the educational and occupational interests involved. There may be a range of motives for prolonging programmes. For example, the recent lengthening of vocational programmes in Sweden aimed to raise the status of the programmes as well as to increase their content.

Coherence and change

Coherence is a central concern of the pathways perspective. Pathways cannot be constructed in isolation. They must link with other pathways. The value of the incentives offered in one part of the system is relative to those offered elsewhere. Pathways through VOTEC for disadvantaged students, for example, cannot be planned in isolation from the nature and role of VOTEC as a whole.

Does the pathways perspective offer a guiding principle for driving educational change and achieving coherence? Young people's own preferences cannot be the principal driving force because they are context-dependent. Their choices and aspirations are shaped by the opportunities and rewards in the education system and in the labour market, and will change as these change. Aspirations are shaped by the pathways themselves, as research on different kinds of school systems makes clear.

In many countries the "market" is being adopted as the main principle for achieving coherence and for driving change, but this is too ambiguous a principle to be a clear guide.[5] It can mean a number of different things: increasing student choice, increasing the number and variety of providers, giving more autonomy to providers, reducing government control or regulation (especially of industrial training), making the system more responsive to the labour market demand for VOTEC graduates, or merely giving higher priority to labour market needs and economic interests. These different meanings do not always combine well. For example, employers are "consumers" of VOTEC in at least two different markets. They are consumers in the labour market where they "purchase"

the graduates of VOTEC (select them for employment); and they are consumers in a different market where they buy or provide VOTEC for their own employees. The operations of these two markets, and their characteristic biases or distortions, are very different. How can "market" principles be used to arbitrate between the two? This problem is particularly salient in "mixed' systems such as the United Kingdom, which increasingly rely on "market" principles to determine the balance between full-time education and employer-sponsored education or training (see Raffe, 1992 for further discussion).

As Keith Drake points out in Chapter 7, government and markets should be seen as complementary, not as opposing forces. However there seem to be two distinct visions of the role of markets in education. In one vision markets have a strategic role in determining the institutional shape of a system. This vision typically involves maximum diversity and minimum regulation. An alternative conception is to view the role of markets as tactical not strategic. In this view, markets require substantial regulation; they are used on a local level to "fine-tune" systems whose main institutional parameters are decided elsewhere. They are not used to arbitrate between widely divergent institutional forms, because each of these has its own "market". For example, Danish vocational schools are being given greater autonomy and are expected to become more responsive to local labour market demands. However, this move towards market principles is taking place within the context of public funding, a clearly defined institutional framework, and curriculum guidelines that protect basic educational objectives. The latter vision may be closer to the pathways perspective.

2. Pathways through VOTEC: policy problems and responses

Many current developments in VOTEC respond to one or more of the following six trends or problems. This list is restricted to the main trends or problems diagnosed from the pathways perspective. Other issues – such as the role of key actors or stakeholders in the policy process – are discussed in the chapters in this volume by Mari Sako and Keith Drake.

More diverse origins: student backgrounds

VOTEC is recruiting its students from a wider range of backgrounds. This is the product of two developments. The first is the expansion of post-compulsory education in general, and of VOTEC in particular, resulting in a much more diverse client group than in the past. This is especially the case where VOTEC has expanded to cater for the young unemployed or other problem groups.

The second development has been an increased diversity, often amounting to polarisation, in the socio-economic circumstances of the age cohort as a whole. On the one hand, there has been an increase in average levels of socio-economic status in most OECD countries. This is a consequence of long-term occupational change, reinforced in some countries by a relatively large decline in the birth rate among families with lower

socio-economic status. The effort is to increase the number of young people with high aspirations for education. This is reinforced by rising levels of parental education, which influences young people's own educational aspirations and attainments over and above the effects of other family characteristics. The results of educational expansion in the 1950s and 1960s are now feeding through into the next generation (see for example Burnhill *et al.*, 1988).

On the other hand, many OECD countries have seen a marked increase in the number of young people from disadvantaged backgrounds. A growing proportion of young people are supported by single parents, or by other family structures which depart from the "conventional" pattern of two natural parents and their children. Unemployment and economic restructuring in the 1980s often resulted in greater disparities of wealth and income. Further, immigration and high birth rates contributed to a rapidly rising ethnic minority population in many countries. For example, in the United States the number of white 18-24-year-olds is projected to decline by 25 per cent between 1985 and 2020, while the number of Hispanic youths will increase by 65 per cent (US Bureau of the Census, 1990). Thus there has been a polarisation during the 1980s, with more young people from the most advantaged backgrounds, but also more from the most disadvantaged backgrounds.

Problem groups: students who fail the system – or whom the system fails

In many countries education has allegedly failed to meet the needs of some proportion of students. The size of this "proportion", as portrayed in current debates, varies from less than 10 per cent of the age cohort to as much as 70 per cent. It is often perceived to be growing, as a result of the system's failure to cope with the growing diversity in background of VOTEC students discussed above.

These "problem groups" are often identified through their educational experiences: low attainment, poor motivation, early leaving or dropping out. These things in turn are assumed to matter because of the resulting disadvantage in the labour market or in adult life. Yet, are their main "problems" educational or labour market-related? This question is further discussed below. Countries vary widely in their perceptions of problem groups. This variation partly reflects different circumstances, but it also reflects differences in education systems and their values and purposes. For example, it has been suggested that high-school drop-outs in Canada, and especially their concentration among particular class or ethnic groups, are a "problem" because they challenge Canadian folk norms of mass participation and meritocracy (Tanner, 1990).

By contrast, much higher rates of early leaving in the United Kingdom, Australia, and New Zealand were only perceived as a major problem when they came to be linked with the more politically sensitive issue of youth unemployment. It should be noted, however, that whereas the UK government continued to define the "problem" of disadvantaged youth as a labour market problem, Australian policy makers re-defined the problem as an educational one. Between 1982 and 1992, the state and federal governments of Australia implemented a series of policies which led to a doubling of the nation's high school completion rates (Vickers, 1991).

More uncertain destinations: labour market trends

The third trend, or set of trends, concerns the labour market destinations of pathways through VOTEC. Most countries have seen a continuing shift in the composition of employment, from primary and manufacturing to service industries, and from manual to non-manual occupations. The implications of these changes for young people vary. In several countries there is concern at the disappearance of the low-skilled youth jobs that were once filled by students who dropped out or left school with only minimal qualifications. Elsewhere, casual, part-time jobs in fast-food restaurants and other services have maintained a relatively buoyant youth labour market.

Perhaps more importantly, changes in the organisation of work, often associated with new technologies, have changed the types of skills used within occupations. At least three types of changes are commonly identified: an increased need for information-handling skills in jobs at a wide range of levels; an increased need for workers with polyvalent skills, or flexible specialists, as traditional skill demarcations are eroded; and an increased demand for personal and social skills, such as the ability to exercise initiative, to work in teams and to interact with clients or customers. All these trends can be found in some sectors in most countries. However the size and direction of aggregate changes in skill demands is far from certain, partly because firms may have large – and possibly increasing – discretion over the organisation of work. The blurring of occupational profiles and occupational boundaries has considerable implications for pathways through VOTEC. Occupations are no longer fixed reference points to guide students through the acquisition of relevant competences: the required competences may change or may vary across firms. Occupational change introduces further uncertainty for students whose ideas of good or secure jobs are influenced by parents or other adults, whose knowledge rapidly becomes outdated.

In many countries the transition from education to employment has become prolonged; the gap between full-time education and secure employment has often been filled by work experience or training schemes, or by temporary jobs often unrelated to young workers' education. In addition, young people may change occupations several times during their early working lives, typically resulting in a weaker link between their area of employment and their initial VOTEC. It is difficult to say whether early occupational mobility of this kind is increasing, but there is certainly greater awareness of it as data have become available from longitudinal studies of young people. The effect, again, is to increase uncertainty concerning labour market destinations.

Mismatches between education and occupation

The fourth type of problem arises from a lack of congruence between the numbers of young people completing different types or levels of VOTEC, and the occupational distribution of available jobs. In some countries the main problem has a "vertical" dimension, with students seeking to enter the labour market at higher occupational levels than the available vacancies. Unemployment or occupational downgrading may result, although this may be only temporary; young people may be mobile in their early years, and the occupational distribution of entry jobs is sometimes quite different from the

occupational distribution of the same workers a few years later. (The surveys of French labour market entrants conducted by CEREQ have shown that the observed match or mismatch can vary significantly over the first five years in the labour market.)

Elsewhere the problem reflects a largely "horizontal" mismatch between the numbers qualifying and occupation at vacancies in particular fields. Occupations such as engineers, teachers, nurses, technicians and skilled construction workers may be hard to fill because the relevant VOTEC lines have failed to attract enough students, although this may reflect inadequate labour market rewards rather than problems of VOTEC itself.

It is only possible to identify "mismatches" on the basis of assumptions about what constitutes an appropriate "match". Consequently countries vary in the extent and nature of their perceived problems of mismatch. Operationally, the extent of match or mismatch between education and employment is often measured by such indicators as:

- the correspondence between the aggregate supply of occupational skills and the distribution of employment across occupations;
- the extent to which individuals entering the labour market find employment in occupations related to their fields of study;
- other labour market indicators, such as the estimated rate of return or, more simply, the earnings or employment rates of young workers from different fields of VOTEC (with low earnings or high unemployment taken to indicate oversupply of workers with skills in the relevant field);
- evidence of skill shortages or recruitment difficulties experienced by employers.

The status of VOTEC

The status of VOTEC is generally perceived to be too low. This is often seen to be the most pressing problem facing VOTEC policy makers, and it is almost universally recognised among OECD countries. The reasons for wishing to raise the status of VOTEC variously include:

- a desire to attract more high-attaining students to VOTEC in general, or to certain skill areas in particular;
- a desire to raise participation in VOTEC; or a desire to raise participation in education generally, but particularly among types of students for whom academic or general education is judged to be a less attractive or less appropriate option;
- a desire to weaken the distinctions between academic and general education, for example in order to infuse more vocational elements into the academic curriculum, or vice versa.

Social objectives

In addition to responding to the needs of "problem groups", many countries use VOTEC to pursue wider social objectives, for example gender equality. Many countries are attempting to increase female participation in traditionally male areas such as con-

struction or mechanics, although the motive is often economic (to increase the supply of skills in shortage areas) as much as social. Countries vary in the relative importance attached to economic and social objectives in VOTEC. They also vary in the extent to which economic and social objectives are seen as conflicting.

Responses

Some of the responses – or proposed responses – to these six problems are summarised in Figure 1. The figure does not describe all responses, but rather those which have the most direct bearing on the construction of pathways through the system. Other potential responses are examined in the various chapters of this volume.

The first two problems discussed above arise from the greater diversity of student backgrounds and from concerns about students who have in various ways failed, or been failed by, the system. These problems invite at least three frequent responses. The first response is to provide more options, or more varied options, from which students may choose. These may involve: new types of curricula, possibly introducing vocational options where they did not previously exist; new types of pedagogy, perhaps with more emphasis on student-centered, experiential or work-based learning; and new modes of study. A second response is to increase the flexibility of pathways, for example to provide a wider variety of entry and exit points, to allow students to study at a pace which suits their circumstances, and to allow easier transfers between pathways, including routes back into "mainstream" education for those who have dropped out. A third response is to provide tighter links between different levels of VOTEC, or between VOTEC and employment. Tighter links between different levels of VOTEC are exemplified by "tech prep" and other schemes to link secondary and post-secondary education in the United States (US Department of Education, 1991). Tighter links between VOTEC and employment may take several forms including an increased use of work experience in the curriculum, greater employer involvement, or attempts to make the connection between completing a programme and entering a job more explicit and more certain, for example through "compacts" with local employers. The aim is to encourage participation and motivate students by demonstrating the relevance of VOTEC and by helping them to develop a vocational identity.

Among the problems discussed earlier, the next two relate more directly to the labour market than to students. These are the inter-related problems of changes in the nature of skill demands (including a growing uncertainty about their future direction) and problems of mismatch between educational supply and labour market demand. At least four responses can be discerned. First, many countries have sought to make the links between VOTEC and particular occupations weaker, or at least more flexible. This may be done by emphasising generic or transferable skills, by combining courses into lines covering a broader range of occupations, by facilitating transfer between courses, or by delaying specialisation. A second response is to weaken and make more flexible the boundaries between tracks or between specialised fields of study. This may include a weakening of the divisions between VOTEC and general or academic education, perhaps by including more common elements and providing for easier transfers between tracks

(OECD 1989, pp. 59-68). For instance, post-compulsory education in Portugal is being designed in terms of a standard matrix, so that all students will have a technical education regardless of their educational track: academic programmes will include technical study as well as the reverse. Another response shifts the balance of functions between pre-employment and post-employment VOTEC, allowing the former to remain less occupationally specific. This has happened with respect to some technical courses in Sweden, but in many countries this response appears to have been discussed more than it has been implemented (OECD 1989, pp. 13-14; Myrberg, 1987). Some countries have relied on market forces to balance supply and demand. This typically puts an emphasis on student choice; students choosing between different fields of VOTEC are assumed to respond to "market signals" such as the employment and earnings of former graduates, and thus to anticipate future labour market needs. Finally, many countries have decentralised their VOTEC systems, to make them more responsive to the demands of local labour markets.

The fifth problem is the perceived need to raise the status of VOTEC. Responses include the weakening of boundaries between VOTEC and academic or general education; making VOTEC more attractive to able students by providing clearer routes through it to higher education; and preserving the exclusiveness of VOTEC (or aspects of it) by imposing strict admissions criteria for particular pathways.

Responses to the final "problem", the social objectives of VOTEC, vary widely because countries' objectives and priorities vary. Egalitarian objectives often point to a more flexible system of pathways and a degree of insulation from labour market pressures. On the other hand, in countries where the main social objective is the integration of all young people into acceptable employment, the response may be to tighten links with employment.

The responses to these six problems all vary across – and even within – countries. Nevertheless some patterns are evident. Increased "flexibility" of pathways is seen as a desirable response to most problems, even if the precise meaning attached to this term may vary.

The solutions proposed to different problems may conflict. There is an apparent conflict between the wish to enhance the status of VOTEC and the wish to use it to cater more effectively for "problem groups". More generally, the responses to problems arising from the diversity of students and of "problem groups" typically involve increased diversity and differentiation; responses to problems arising from labour market concerns typically involve weaker differentiation, or at least new and more flexible forms of differentiation. Some countries (for example, in North America) appear to be more preoccupied with student diversity, whereas in others (for example, in northern Europe) the focus is almost entirely on labour market issues. Countries in these two regions may be moving in opposite directions as America examines "apprenticeships" and Europe seeks more flexibility. This suggests a convergence, with the more comprehensive North American systems and the more differentiated European systems moving towards each other. Another possibility indicated by this analysis is that pathways through post-compulsory education and training may come to be differentiated less in relation to their labour market destinations and more in relation to the social and educational origins of their students.

3. The construction of pathways: some current issues

Section 2 identified some trends and problems currently facing VOTEC in OECD countries and some actual or proposed responses. However these responses are subject to the various constraints discussed in Section 1. Listed below are some resulting dilemmas or issues for VOTEC, in the form of seven questions. They are far from being a complete summary of current issues facing VOTEC, even as diagnosed from the pathways perspective. Their resolution will depend on the institutions and circumstances of each country as well as on the public purposes of VOTEC.

Question 1: Can (or should) education systems remain (or become) heterogeneous? If so, how?

A heterogeneous system is something more than just a diverse one. A heterogeneous system (as defined here) not only has a variety of pathways; it also has different types of pathways, governed by different values, with different criteria of success and with different factors influencing success. The attractions of heterogeneity are easy to recognise. In a heterogeneous system, students who are disenchanted with abstract academic learning can opt instead for a pathway which emphasises practical or experiential forms of learning; or students can opt for a form of education more congruent with their cultural backgrounds. Heterogeneity is believed to contribute to the success of the dual system of the German-speaking countries: young people who do not wish to continue with full-time study may enter an alternative set of pathways, with different values and different reward systems. Heterogeneity is also a response to the various problems raised by the diversity of student backgrounds and interests and by the failure of mainstream education to meet the needs of particular groups of students. It promises "prizes for everyone": those who fail in one kind of competition can take part in another in which their chances of success might be greater.

The credibility of this strategy might be questioned: some people seem to lose in all kinds of competition; and even if they win, some of the prizes may not be worth very much. However the main problem facing systems which seek to remain or become more heterogeneous may be summarised in the following proposition: it is easier to sustain heterogeneity in systems where different pathways lead to different destinations, than in systems where different pathways lead to common destinations.

Different destinations have different value systems, reflected in their different criteria for selection or admission. These vary across different sectors of the labour market, and also between the labour market and the education sector. The value and reward systems of each pathway tend to be influenced by those of the destinations to which it leads. Education systems in which each pathway leads to a unique and different destination are more likely to maintain a distinct value and reward system for each pathway. Such systems can thus more easily remain heterogeneous, in the sense described above. By contrast systems with flexible pathways which lead to multiple and common destinations are more homogeneous. Usually they are influenced by the values of higher education, the most influential destination. The success of the German dual system may

depend in part on the relative weakness of the pathways leading directly from it to higher education.

Many of the pressures discussed in Section 2 are weakening the links between pathways and destinations. The desire to weaken the boundaries between academic and vocational tracks; the pressure to make tracks more flexible in occupational terms, in order to minimise problems of mismatch; the desire to raise the status of VOTEC by providing pathways through VOTEC to general streams or to higher education: all these factors contribute to a situation where different pathways increasingly lead to common or at least overlapping destinations. Heterogeneity is therefore harder to maintain. Even in Germany, one of the most successful examples of heterogeneity, it is feared that too few able youngsters are entering the dual system to meet future skill demands. It is suggested that new routes be developed through the dual system to higher education, but this in turn might threaten the distinctive values and reward system of the dual system.

Programmes for "problem groups" face the dilemma most acutely. On the one hand, they seek to introduce heterogeneity: to motivate their students with education based on different values, and different reward systems, to those of the mainstream. On the other hand they aim to re-integrate their students into mainstream education or the labour market, in other words the same destinations as those to which more conventional pathways lead. They cannot ignore the values and criteria of success associated with these conventional destinations. There is a precedent in the experience of compensatory education in the 1960s and 1970s. Community-based approaches based on the culture and circumstances of disadvantaged groups appeared to motivate their students and achieved some educational success; but they risked trapping their students within the subordinate culture, rather than helping them gain competence within the dominant culture of the society in which they needed to compete.

Question 2: Are qualifications a sufficient basis for coherence in education systems? If not, what else is needed?

The one general message of a recent OECD report was that "post-compulsory education has to be both diverse and coherent". There was a "need for a common and commonly-understood currency of qualifications which will allow the various parts of the system to relate to one another and to the outside world" (OECD, 1989, pp. 13-14).

Coherence is an important issue where systems become more diverse, and especially where pathways become more flexible in the sense of allowing a greater variety of entry and exit points and more opportunities for changes of direction. But the role of qualifications illustrates some of the problems of reconciling diversity and coherence.

Systems of qualifications are perhaps a necessary, but not a sufficient, condition of coherence. There are three main reasons for this. First, qualifications and the assessment that underlies them may lack credibility in the eyes of those who use them, in particular, selectors at later stages of education or in the labour market. If selectors doubt the validity of qualifications they may instead use other selection criteria, such as the institution where the qualification was obtained or the length of time it took to achieve it. The consequences may be most serious in diverse systems in which different institutional

pathways lead to the same qualification. For example in Scotland, vocational modules are sometimes perceived to have greater value if obtained in a college (where more equipment is likely to be available) than if obtained in a high school. This undermines the notion of qualifications as a "common currency".

Second, the functions of qualifications may vary across different parts of the system. For example, they may variously be used as a basis for selection to continuing education, as a basis for selection to the labour market, or as quality assurance for employers who have sponsored their own (present or future) employees for education. When qualifications are used in selection, they are typically required to differentiate students "vertically" in terms of general attainment or potential: such qualifications are often expected to be norm-referenced, graded, classed into levels and grouped, or in a standard format to facilitate comparisons between students with different qualifications. When qualifications are awarded for employer-sponsored education this selection function is weaker or absent and "horizontal" differences in competence are more important than "vertical" differences in potential. Such qualifications tend to be criterion-referenced, competence-based, narrower in scope, and more varied in format (often modular), since they are less likely to be used to make comparisons between students. Japanese vocational qualifications are examples of this kind (Sako and Dore, 1988). It can be very difficult to devise a common framework of qualifications that is equally well adapted to multiple functions, as the experience of the modular reforms in Scotland, and more recently the development of National Vocational Qualifications in England and Wales, illustrates (Raffe, 1988; Hodkinson, 1991). In Finland a similar problem is being addressed through a double qualification system, in which students can simultaneously pursue vocational qualifications and university matriculation.

Third, qualifications can only be a basis for coherence if they are themselves perceived to have value. The labour market value of vocational qualifications may vary, not only across sectors of the labour market, but also between national and local labour markets (OECD, 1989, p. 95). If qualifications systems are not a sufficient condition for coherence, what else is needed? While national systems of qualifications, equivalencies and progression routes may create formal coherence, their actual effectiveness depends on the extent to which they are used by firms' recruitment officers, college admission personnel, and other key actors at a local level.

Local institutional linkages may play a complementary role. However local linkages cannot effectively substitute for a national qualifications system. For example, very considerable effort and resources are devoted to career academies, youth apprenticeships, tech prep programmes, and other approaches for assisting in the transition from school-to-work or further study in the United States. Much of this effort is used to establish basic communication and trust, and many of the functions served could probably be more efficiently fulfilled by an effective national qualifications system. If qualifications represent currency, then systems which rely only on local linkages may be seen as barter economies, with all the associated inefficiencies.

The scope for coherence in a diverse system may depend on the way in which diversity is organised. The British experience suggests that coherence can be difficult to achieve in a system which mixes education provided before selection for employment

with education provided after selection for employment, and which lacks an agreed and consistent principle to govern their respective roles (Raffe, 1992).

Question 3: Are occupations the most appropriate basis for organising VOTEC and the pathways through it?

Occupational socialisation is widely recognised as a latent function of VOTEC, part of its "hidden" curriculum. In many systems there is no attempt to "hide" this part of the curriculum: occupational socialisation, and the development of occupational identity, are made central principles of the curriculum and organisation of VOTEC. This is especially true of northern and central European countries.[6] Elsewhere, educational reformers seek to use the vocational impulse and the acquisition of occupational identity as a basis for motivating young people who are disenchanted with mainstream education, especially members of the various "problem groups" discussed earlier.

If "occupational identity" is a central principle of VOTEC, there must be a good fit between education and occupation, that is, a close and explicit link between the content of VOTEC and the student's expected occupational destination. This may be unrealistic.[7] Occupational destinations are influenced by various ascriptive, social and geographical factors as well as by education. The fit between education and occupation varies across countries, but nowhere is it perfect. It is particularly loose in respect of educational provision for the unemployed or for groups with other labour market disadvantages, whose most realistic job prospects are in sectors where employment is uncertain, job mobility the norm and the available occupations not those for which it is easy to acquire an "identity". Young workers are frequently mobile between occupations in their early working lives. This mobility usually weakens the links between education and occupation, and raises the question of the extent to which initial VOTEC should be oriented to entry jobs alone. Moreover, future developments in the labour market are uncertain and difficult to predict, and may be subject to increasingly rapid change. Not only are the future working lives of individuals unpredictable, but so are future skill demands and the way that skills are combined within occupations and jobs.

Such considerations have encouraged many countries either to attach more importance to generic or transferable vocational skills or to develop pathways with weaker or broader occupational links. France, the Netherlands, and Sweden, for example, have merged VOTEC lines into fewer but broader areas of study; Australia is developing "generic" apprenticeships leading into families of occupations, and similar proposals are being explored and experimented with in the United States. Several countries – often as part of the same process – have delayed the point at which students are required to specialise; others have increased the flexibility of subject choices, for example through modularization in such countries as the Netherlands and Scotland. More generally, the outcomes and objectives of VOTEC may be increasingly defined in terms of competences rather than occupations.

Do these trends mean that "occupational identity" becomes less important in the curriculum of VOTEC? Must alternative ways be found to motivate students? And do

systems based on competences rather than occupations provide clear signals to guide student choices?

Question 4: Does the concept of "stages" of education need redefinition?

Section 1 suggested that the planning of pathways was inevitably constrained by the demands of learning – by the curriculum of VOTEC, and by the practicalities of delivering the curriculum. In the OECD report mentioned earlier, Geoffrey Squires suggested that the curriculum could be understood as following three stages: general, foundation and specific (OECD, 1989, pp. 19-32). The precise sequence of stages will vary from country to country, but the common principle is that the character of education should change as the student progressively moves from basic education to a specific occupational orientation.

A longitudinal or development perspective is essential to any understanding of VOTEC and its role within education systems. For example, the problem of the relatively low status of vocational education compared with academic/general education may seem less intractable if these are perceived not as alternatives but as stages through which all young people should pass, although they would not all do so in the same time frame. In this view, status concerns the relative esteem of the vocational education which lower-attaining students receive. Such students tend to enter VOTEC relatively early in their educational careers, in contrast with higher-attaining students who specialise later on. Equally, a longitudinal perspective suggests that current debates about school-based versus work-based systems probably miss the point. The important question is rather: what sequences of different types of provision are required, and at what points should students switch between them?

However to express this longitudinal perspective in terms of curricular stages, such as Squires' general, foundation and specific stages, is to raise at least two questions. First, are the stages justified either by the structure of knowledge or by the process of student learning? This question is not studied here, but some of the issues, such as the assumed hierarchy of learning, are discussed in Senta Raizen's chapter in this volume. Second, is the concept of stage too rigid for the greater flexibility now being introduced for pathways through VOTEC?

A simple example is provided by the attempt, in many countries, to provide routes through VOTEC into mainstream higher education. Experience suggests that these routes are often illusory, and that few young people travel successfully along them.[8] Might this be because curricula are still organised on the principle of stages, whereas routes from VOTEC to higher education often imply moving back a stage, from specific to foundation or from foundation to general?

Similar issues arise when systems try to introduce common core curricula, or to weaken patterns of differentiation, among students in the same age group or at the same level of education, such as post-compulsory or 16-19 education. This level of education may cater for students at different curricular stages. For example post-compulsory education may cater for students aspiring to higher education (at the general curricular stage), for students anticipating further vocational study (foundation stage) and for students

anticipating early entry to the labour market (specific stage). Each student is thus assumed to be set on a relatively predictable and well-defined educational and occupational trajectory. However when differentiation becomes weaker, and pathways become more flexible, post-compulsory education must not only cater for students at three different curricular stages of education; it must also allow for increased uncertainty and flexibility concerning which student is at what stage. This kind of situation is familiar to educators who have to prepare students simultaneously for the possibility of entry to higher education, of progression to further VOTEC, or of direct entry to the labour market.

If pathways continue to become more flexible, the concept of curricular stage may also need to become more flexible. We are accustomed to treating "general" and "vocational" as inadequate labels for different kinds of students; are they equally inadequate descriptions of different stages of a student's educational career?

To the extent that some notion of curricular stages continues to be necessary, but students progress through stages at different rates, there will always be a tension between planning for coherence within an age group or level of education (such as 16-19s or post-compulsory education) and planning for coherent progression across stages. One response is to shape plans around functions or outputs rather than around institutions or age groups. The sequencing and pacing of education would thus become more variable. For example, the document which introduced the Scottish modular reforms was first known as the "16-18s Action Plan", but this subsequently changed to the "16-plus Action Plan", and the modules are now available to 14- and 15-year-olds as well.

Question 5: How can more diverse and flexible systems remain (or become) "transparent"?

Young people in many countries have criticised schools for failing to prepare them with enough information and advice about the available labour market opportunities and the educational pathways open to them. Many systems have increased guidance and counselling provision in recent years, particularly for the problem groups discussed earlier. As pathways through VOTEC become more diverse and more flexible the counselling task becomes more important. But it also becomes more difficult.

On the one hand, guidance and counselling can be more difficult for student groups with varied backgrounds, aspirations and opportunities. The same guidance programme might be perceived by some students as not offering enough specific information and suggestions, and by others as patronising because of the specific information it provides. The independence of advice (or at least its perceived independence) may be threatened in systems where pathways are diverse. In Scotland this is illustrated by the perceived tension between school-based guidance teachers and externally-based career officers.

At least in folklore, guidance teachers are believed to favour school-based options and career officers to favour college- or work-based options. Where diversity involves competition between institutions, counselling may easily turn into selling.

On the other hand, the need for independent information and advice increases as pathways become more varied and complicated, as the number of decision points

increases, and as labour market destinations become less predictable. The problem is aggravated by the possible tendency, as systems become more diverse, for actual pathways to be less and less well described by formal accounts of them. This type of divergence between reality and formal descriptions was discussed in Section 1 in relation to Italy and Scotland. For example, while two pathways may lead to the same qualification, or to qualifications which are formally equivalent, one may in practice have a much greater value in the labour market or further education than the other. The likelihood of this kind of discrepancy increases as systems become more diverse. But counsellors may find it easier to advise students about formal pathways than about actual pathways. Moreover, since their advice may be acted upon and may have a legitimating function, public guidance and counselling services may be under strong pressure to describe pathways as the public authorities would like them to be, rather than as they actually are.

Education systems are more transparent, the slower their rate of change; the relative success of several European systems is often attributed to the incremental nature of their reforms, and to their readiness to preserve widely-known systems, qualifications and terminology. However in some circumstances the aims of VOTEC policy may seem to require less transparency. For example, programmes for disadvantaged students need the promise of success in order to motivate their clients but they may, for purely positional reasons, appear to have a low success rate and become stigmatised. The result is often a rapid turnover of programmes, each similar in purpose and function, but each seeking to emphasise its difference from the stigmatised programmes that preceded it.

Question 6: Are problem groups identified primarily in terms of educational failure, labour market failure, or in terms of the unequal social distribution of either of these?

The temptation may be to answer "all three". All are legitimate concerns of public policy. However, because educational underachievement and labour market underachievement are correlated, and because both tend to be concentrated among disadvantaged social and ethnic groups, the three types of problem tend to be conflated. There are political reasons for seeking to link them: in many countries the pursuit of social equality, or the desire to deal with youth labour market problems, have provided a political impetus for reforms of education/training that would not otherwise have existed.

However these three dimensions of the problem – educational, labour market and distributional – must be distinguished if the right remedies are to be found. The best programmes and policies for dealing with unemployment and the best programmes for reducing educational underachievement may be very different. For example, one approach to labour market problems may be to design interventions which place young people with employers or in contact with the channels through which jobs can be found. The policy dilemmas experienced by such interventions are illustrated by the British Youth Training scheme (YT). Many trainees left the scheme early because they had been offered jobs by work experience providers. Were they to be counted as failures because they did not complete their training or as successes because they found jobs? There was

thus a tension between the scheme's (un)employment functions and its education/training functions.

The third definition of the "problem" is less concerned with the level of educational or labour market underachievement than with its unequal social distribution, and its concentration among particular ethnic or social groups. The problem is thus one of inequality, and the appropriate responses are redistributive.

Question 7: Are the problems concerning the "bottom 10 per cent" the same as the problems concerning the "bottom 40-70 per cent"? Are the solutions the same?

A second area of ambiguity in the definition of "problem groups" is just how large they are. In most countries it is possible to identify a group of young people with problems requiring educational or labour market interventions of a compensatory or remedial kind. Describing these as the "bottom 10 per cent" is arbitrary, but emphasises their status as a relatively small minority. In many countries there is a larger group – "40 per cent" and "70 per cent" are often mentioned – whose education is alleged to require reform. The "bottom 40-70 per cent" typically includes students in mainstream VOTEC in the European systems. The reforms addressed to them may have different objectives from those addressed to the bottom 10 per cent. For example, the focus may be on raising the status of VOTEC or improving the supply of skills.

Innovation and change tend to be found most often in the sectors of education that cater for lower-attaining students and for problem groups. Not surprisingly, therefore, reformers often seek to extend the more successful of the innovations introduced for the "bottom 10 per cent" to other students; or they wish to use the pressures for reform arising from the problems of the "bottom 10 per cent" as a lever to achieve wider education reforms, typically including the reform and strengthening of VOTEC.

Can this strategy work? In practice it encounters two major difficulties. The first is that educational change spreads more easily from the "top down", in terms of educational status, than from the "bottom up". Innovations designed for low-status students themselves acquire low status. In the United Kingdom broad-based approaches to VOTEC tend to have low status relative to more occupationally specific programmes, because they were often first developed on schemes for unemployed young people, who had no specific occupations to train for.

The second difficulty is that both the "problems" and the "solutions" relating to the bottom 10 per cent may be different from those relating to students further up the continuum. Section one contrasted systems which gave policy priority to students in the lowest quartile with those which gave priority to students in the two middle quartiles. Systems which give priority to middle-attaining students tend to enhance the status of VOTEC by maintaining a strong distinction between "mainstream" VOTEC and programmes catering for the unemployed or other disadvantaged groups. Such systems also tend to weaken the divisions between VOTEC and academic/general streams, for example by facilitating transfers or by giving VOTEC streams equivalent access to higher education, as is the case in France and Italy. They may further buttress the status of

VOTEC through stringent assessment, resulting in high failure and drop-out rates. Systems which give priority to low-attaining students typically provide open or relatively unrestricted access to VOTEC, with less stringent assessment, and with no clear distinction between regular VOTEC and provision for special groups. In practice such systems are likely to have a less developed VOTEC sector and clearer divisions between VOTEC and academic or general education. Their education policies are likely to have responded to social pressures more than to economic ones. They may also face problems of coherence. Systems which are designed simultaneously from the top down (starting with high-attaining students) and from the bottom up (starting with low-attaining students) may fail to achieve a satisfactory join in the middle.

It used to be an axiom of economic policy that a government needed at least as many policy instruments as there were policy targets to aim at. This axiom seems to be relevant to current debates in VOTEC and was particularly apparent in the Youth Training scheme in Britain. YT found it difficult to combine its two functions – an unemployment-relief scheme and an instrument for revitalising youth training. So, too, it is difficult for reforms elsewhere to simultaneously meet the needs of the bottom 10 per cent and to achieve the more wide-ranging reforms of VOTEC.

4. Conclusion

This chapter has developed a pathways perspective on the problems of VOTEC, and has used this perspective to analyse seven key policy problems in this area. The pathways perspective is not new; it is implicit in recent policy for VOTEC in several OECD countries. This chapter has tried to make it explicit. The next step is to use the pathways perspective as a framework for empirical study. The best test of the pathways perspective will be its ability to help countries to learn, both from their own policy and practice in VOTEC, and from the experience of other countries.

NOTES

1. In Britain, a recognised certificate is awarded at the end of the compulsory years and those who remain after this are referred to as "staying on". Early leavers are not "dropouts" in the American sense. David Raffe, "School Attainment and the Labor Market", in David Raffe (ed.), *Fourteen to Eighteen*, Aberdeen University Press, Aberdeen, Scotland, pp. 174-193.
2. The *baccalauréat* is the principal certificate awarded at the end of the upper-secondary education in France, and (at least in principle) it confers an entitlement to enter university. The number of students continuing to *baccalauréat* level has risen sharply from 35 per cent in 1985 to nearly 55 per cent in 1990, and is still rising; the government has declared its intention to raise the proportion to 80 per cent by the year 2000. This has stimulated a vigorous debate on the role of vocational education: see Lucie Targuy (1991), *Quelle Formation pour les Ouvriers et les Employés en France?*, La Documentation Française, Paris.
3. EFG (Basic Vocational Training) was introduced in 1977 in an attempt to overcome the narrowness and inflexibility of traditional apprenticeship. It offered a year of full-time broad vocational education, usually followed by two or three years' practical training with an employer, and part-time attendance at a vocational school. Since 1989 it has been integrated with apprenticeships and other vocational programmes.
4. This draws on articles in *Formation Emploi*, No. 24, April-June 1988.
5. For a discussion of "education markets" see OECD (1989), pp. 29-32, and Chapters 6 and 7 in this volume.
6. See for example the discussion of Finland by Matti Vesa Volanen (1984), "The Transition from Vocational Education to Work in Finland", in Peter Grootings and Michael Stefanov (eds.), *Transitions from School to Work*, Institute of Youth Studies, Bulgaria; and in Wladyslaw Adamski and Peter Grootings (1989), *Youth Education and Work in Europe*, Routledge, London/New York.
7. For a discussion of these trends in the Netherlands, see Jittie Brandsma (1990), *How Strong is the Bridge Between School and Work?*, Enschede, Center for Applied Educational Research, University of Twente, the Netherlands.
8. See for example the discussion of Italy in CENSIS (1989), *Italy Today*, pp. 66-67.

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Chapter 5

LEARNING AND WORK: THE RESEARCH BASE

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Vocational and technical education generally are discussed in connection with their contribution to skill formation in the workforce and, hence, to the productivity of individual workers and of the labour force at large. This chapter takes a different approach: it attempts to bring together research by psychologists, anthropologists, and sociologists, which, over the last ten years, has been building toward a clearer understanding of how people learn in school and out. It explores ways of creating learning situations that link the acquisition of cognitive skills and knowledge with real-world activities, including employment-based training and other forms of situated learning. Hence, it speaks to the second important linkages theme in this volume: the "integrated learning" theme.

The chapter addresses the following questions: Given the current changes in the world of work, what are the skills and competences that characterise good work performance? How are these acquired? What settings foster their acquisition? What are the relationships between "basic" or general skills (literacy, numeracy, reasoning skills, ability to solve problems), knowledge in a specific domain, and job competence? How effectively do people transfer their formal school-based instruction to situations outside school? What are the differences between expert and less skilled work performance, and what are the roles of apprenticeship and more informal on-the-job training in acquiring expertise? In short, what are the implications of recent cognitive and learning research for educating individuals to become successful at work – both at initial entry and in later career stages?

The evidence is strong that learning and motivation for learning are mediated through activities embedded in a context that makes sense and matters to the learner. Because learners have different backgrounds, it follows that not all contexts are equally effective for all learners or for all types of learning. Yet, in countries like the United States, where there are very limited opportunities for apprenticeship placements, formal schooling is the chief vehicle for preparing students for work, as well as for further education. School is intended to provide students with the general skills to obtain a job;

schools also have assumed responsibility for vocational education, a loosely defined track involving about one-fourth of the American high school population. Both general and vocational education are intended to ready students to obtain employment; but their education also must prepare students to become good learners, so that they can continue learning on the job.

Unfortunately, formal schooling does not provide the necessary skills to a large percentage of young people. Research has shed light on the dysfunctionalities of traditional classroom education – whether vocational or general – with respect to preparation for effective work performance. Research and experience also provide a good understanding of how training for effective performance can be achieved through the apprenticeship model as it developed in the crafts, is still practised in such professions as medicine, law, and scientific research, and has been adapted to modern industry in Germany and certain other European countries. Much less is known about informal modes of learning in today's work place, which is characterised by obscure, difficult-to-observe, and often symbol-laden operations and may lack the clarity which can be observed among apprentices, journeymen and masters in the traditional apprenticeship system. Nevertheless, some inferences are possible about optimal settings at school and at work to promote development of both general and specific work skills. The paper concludes with a discussion of some obstacles that stand in the way of creating such optimal settings.

1. Characteristics of effective workers

The argument that the economies of industrialised countries are undergoing a major transformation is by now a familiar one. This transformation, no less fundamental than the shift from an agricultural to an industrial economy a century ago, can be characterised as follows: the extension of human muscle power which ushered in the industrial age is being paralleled by the extension of human brain power through the artefacts of the information revolution – computers, automation, and telecommunications. Furthermore, these technologies have created such rapid information exchange that the economies of countries and even continents are becoming ever more closely linked, creating one global economy. The United States, for example, is still taking its first halting steps toward recognising that it now must compete in a world market rather than relying solely on domestic consumption as being the engine of productivity.

These developments have several consequences. First, manufacturing in industrialised countries is changing its character. Most new jobs will be in the service industries, and while some will require high-level skills, others – often those that are growing most rapidly – will require very little training. Second, the pace of change can be expected to increase as technological advances increase, making all but the broadest forecasts about labour market needs increasingly tenuous and leading to obsolescence of vocational education programmes that are designed around tightly defined skills. Because of these uncertainties, many analysts argue that programmes to ready individuals for work should emphasise generalisable skills rather than training for a specific occupation.

This raises the following questions:

- Is it possible to define effective performance in general terms?
- Are there characteristics shared by expert workers that are independent of the task being performed?
- If so, what are the general skills that "experts" share, and how do these differ from the basic skills that have traditionally been part of formal schooling?

New skills or old?

One difference is that current listings of skills needed in the changing work environment try to encompass dispositions and habits that would make individuals effective in almost any setting. For example, a recent list developed by Levin and Rumberger includes several cognitive competences, generally deemed to be goals of formal education: communication, reasoning, problem solving, obtaining and using information, and the ability to continue learning (Levin and Rumberger, 1988). But they also list the following dispositions as needed in the workplace: the willingness to take initiative and perform independently; the ability to co-operate and work in groups; competence in planning and evaluating one's own work and the work of others; understanding how to work with persons from different backgrounds and cultures; and the ability to make decisions. A recent survey of Michigan employers gave highest priority to personal management skills (self-control, honesty and integrity, pride in one's work and respect for others), second priority to academic skills, and third priority to teamwork skills (Roeber *et al.*, 1989).

It is worth asking to what extent the competences needed in the technological workplace are really new or different in kind, and whether the differences have as yet been identified. For example, the competences listed by Levin and Rumberger as necessary to function effectively in newer work settings are nearly all competences that workers displayed in the milk processing factory – a very traditional work setting – studied by Scribner and described in some detail below (Scribner, 1986). Current studies on the changes in the workplace being brought about by complex technologies are providing further insights on new requirements for workers (Martin and Scribner, 1988; Scribner and Sachs, 1990).

Another question that arises is the extent to which the work environment, with its increasing complexity and attendant stress on understanding and manipulation of symbolic representations, will come to resemble and rely more and more on the academic strand of education. This may be particularly true of middle- and upper-level jobs. Diagnosing a problem, gathering and interpreting information and applying it to a problem situation, reporting on the problem and its solution and using supporting evidence to strengthen the report – all these take on the hallmarks of academic work, particularly when the operations and functions involved are heavily symbol-based and require considerable knowledge and interpretation. Rather than relying on managerial expertise, such functions as inventory management, product control, and costing are now computerised through programs that are based on formal conceptual systems, resembling such traditional school subjects as mathematics or grammar (Vaughan and Berryman, 1989). One

might speculate that the separation between school and work is actually shrinking, that school learning will become more functional for effective job performance as the application of technology continues to make the work environment more symbol-dependent. Much more empirical research is needed before such a conclusion can be reached. In any case, in the United States at least, large numbers of people in school are not acquiring the very competences that school is designed to teach and that may become more and more valued in the workplace (Dossey *et al.*, 1988).

Describing effective workers

One major stream of recent cognitive science research has been the analysis of the performance of expert workers. In contrast with earlier research, which disaggregated complex tasks into abstract hierarchies of what were thought to be component skills, the new focus is on how experts actually do their jobs. Such studies of performance, ranging from analyses of school-related formal learning tasks to complex technical occupations, have provided important insights and led to some very successful training programmes (Glaser and Bassok, 1989). One important finding is that, for such technically demanding jobs as dealing with complex electronics systems or specialised computerised information, traditional literacy skills appear to be imprecise and limited in their usefulness. Instead, the job skills most closely linked to proficiency entail the ability to integrate specific job knowledge and skills with more generally effective ways of approaching problem situations (Gott, 1984).

Based upon studies of expertise, Taylor has characterised effective workers as follows:

i) Effective workers simplify the task, using short-cuts and developing least-effort strategies.

ii) When necessary, effective workers redefine externally defined problems into personally constituted problems. They are able to differentiate between routine problems that require nothing more than the application of set procedures and problems that require (or become more tractable through) redefinition.

iii) Effective workers use flexible strategies as they depart from the literal framework and reorganise the assigned task to "fit" with the available social, symbolic, technical, and material resources at their disposal.

iv) Effective workers develop tentative "gap-closing" or intermediate solutions.

v) Effective workers collaborate to develop situated explanations, examine contradictions, explore procedural possibilities, and discuss alternative solutions.

vi) Effective workers produce accurate task completion solutions.

vii) Effective workers continue to develop competence (Taylor, 1989).

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2. Acquiring competence

How do workers acquire these characteristics? Two streams of research provide some answers: psychological research concerned with the individual learner, and anthropological and sociological research on learners as they address tasks presented in the physical and social context of work and other real-life situations.

The individual learner – connections between knowledge and performance

As noted, observing differences in problem-solving skills between experts and novices – how they vary with respect to their knowledge and the procedures they use – has proved a fruitful line of investigation. Analyses of complex performance have tried to establish links between knowing and doing, that is, between how declarative knowledge (knowing) relates to procedural knowledge (doing). This entails asking how the organisation of knowledge in the learner's head affects performance and what role domain-specific knowledge might play. Findings from this sort of research are not just theoretical; they have direct implications for instruction in and out of school and have led to the development of effective courses and tutoring programmes for sophisticated technical work.

Declarative knowledge and procedural knowledge

How do declarative knowledge (''knowing what'' – the objective of formal education) and procedural knowledge (''knowing how'' – usually acquired through experience, but sometimes explicitly taught) interact to increase performance?

In the mid-1980s, Alan Lesgold and his colleagues studied the performance of United States Air Force technicians training to be jet engine mechanics and avionics technicians (Lesgold *et al.*, 1986). They observed that even first-term technicians who had little training varied with respect to their performance. Interestingly, the more highly skilled mechanics did not demonstrate greater general knowledge in the areas in which they performed better, such as planning general strategy, understanding electrical/electronic concepts, or accuracy and efficiency in the use of instruments. Also, there were no differences between the less and more skilled groups in basic language and number skills. Nevertheless, the latter performed better. They made more correct diagnoses, had better mental models of the systems they were working with (how components work, what their functions are, and how they relate to the system as a whole), and were more efficient at troubleshooting the specific equipment with which they worked.

Lesgold and his colleagues concluded that the difference was not in school learning but in learning from informal experience. On the basis of their analysis, these investigators designed a successful computerised tutoring program posing realistic problems and giving immediate feedback on student responses. This approach, which allows the student mechanic to practice diagnosis and troubleshooting, contrasts with traditional training in which the student is expected to carry out, often without understanding, physical steps designed by someone else. Thus, the computerised tutoring program – the design of which is based on the analysis of competent performance – produces understanding

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through meaningful practice, provides problems at appropriate levels, and takes place in an environment of supportive criticism.

This research and its practical application confirms current theory on the relationship of declarative and procedural knowledge in effective problem solving (Lesgold *et al.*, 1986). Individuals confronted with non-routine problems first try general, domain-independent strategies for problem solving. Strategies generated at this stage are then considered in light of the relevant declarative knowledge, and inappropriate strategies are rejected. Over time, the trainers develop – through practice – strong, reliable thinking and problem solving procedures. In this process of learning to become an expert, a more experienced co-worker or supervisor (or a well-designed tutorial program) can be helpful in reinforcing the most appropriate procedures.

Domain-specific knowledge and its organisation

Knowledge of the subject matter appears to be central to the way experts approach problems. Their superior knowledge of an area allows experts to recognise the general type of problem which confronts them. If it is a new problem, they may try analogies to get at the basic nature of the problem, or they may reinterpret it until a solution becomes apparent. Novices, on the other hand, respond to problems as they are presented, using routinised procedures for manipulating those pieces for which they have rote algorithms. They tend to observe surface features and apply formulaic procedures that relate only to the surface features.

Much of the difference between experts and novices appears to arise from the way they organise information. For example, expert chess players chunk sub-structures or patterns applicable to solutions, thereby freeing working memory for addressing the deeper structures of the problems. They appear to link salient information and organise it around central principles (Eylon and Linn, 1988). They then select appropriate strategies and actions to address a given problematic situation, and they test these out in order to pursue the best approach. This involves, in addition to structured, domain-specific knowledge and procedures, more general skills in planning and checking one's work.

Summarising findings from research on learning in science, Eylon and Linn write: "Research shows that experts engage in more cognitive monitoring than do novices, [possibly] because [novices] lack techniques for evaluating their approaches [or because for novices] problem solving may require all available processing capacity, preventing reflection" (Eylon and Linn, 1988).

The conception of problem solving performance discussed in this section postulates: tight coupling to domain-specific knowledge and knowledge structures in the head, an understanding of conditions and procedures for the use of that knowledge, and general facility for managing one's own learning (meta-cognitive skills).

Although much of the research on experts and novices concerns such highly structured fields as playing chess, mathematics, and physics, the conclusions regarding the importance of knowledge within a domain seem to hold in other fields as well. For example, Sticht has found that "material written on a topic about which the student has developed some prior knowledge will be read and understood better (...) reading compre-

hension in a given topic can be improved by increasing one's knowledge base in that area" (Sticht, 1987). Accordingly, teaching domain-specific knowledge should go hand-in-hand with providing strategies for reading pertinent material, allowing students to acquire both more subject matter knowledge and more generally useful literacy skills.

In general, however, the work on experts and novices has not given much consideration to distinctions between high-and low-aptitude learners. Glaser comments that the current understanding of expertise "is probably biased by the highly structured domains" in which it has been studied, domains that tend to be dominated by individuals with high aptitude (Glaser, 1987). More research is needed on possible variations in learning style among individuals of different aptitudes as they move from being a novice to becoming a competent performer.

Using the human and physical environment in learning

Through observing people doing problem-solving on the job, cognitive scientists oriented toward sociology and anthropology are developing a quite different line of inquiry (Rogoff and Lave, 1984). They criticise past research on cognition because it has tended to focus on individual mental activity without sufficient attention to the wider social and physical context in which any task or problem is embedded.

For example, Morris and Rouse, in an extensive review of research on troubleshooting and problem solving in electronics, found that most of the problems presented to the research subjects, even though they involved a variety of media (paper-and-pencil tasks, computer-based simulation, and occasionally even hardware), were generic or context-free and not intended to be part of any real system (Morris and Rouse, 1985). As a result, these authors consider the research findings of little help in understanding actual performance.

In contrast, researchers using the tools of anthropology and sociology have examined the acquisition of expertise in such tasks as doing sales arithmetic, performing a variety of jobs related to the distribution of milk products, and troubleshooting ill-defined problems in servicing photocopying machines. In none of these areas do expert workers call upon rote algorithms learned in school, nor do they proceed through routine checklists. Rather, they call upon a range of clues provided by the environment, the practice and experience of their fellow workers, and their own situated knowledge to address the task at hand (deKleer and Brown, 1984, pp. 1-3; Orr, 1987*a*, 1987*b*, 1988). Scribner reflected this research when she spoke of the environment not just as the context in which a problem is embedded, but as an active component of problem solving (Scribner, 1984).

The work of Scribner and others focuses on situations in which novices begin with no specific knowledge of the particular work setting. Beginning workers come to the situations studied only with everyday knowledge and general school learning. They gradually become more expert as they become familiar with the work setting and actively use it (that is, its specific social, symbolic, technical, and material resources) to complete assigned tasks with greater and greater success. Later steps in the development of exper-

tise involve inventing more efficient problem solutions and sharing with others one's problem-solving expertise.

To understand more fully the implications of considering the environment as part of any problem-system facing an individual expert or novice, it is useful to distinguish among several components of such a system: other actors occupying various roles, the physical setting, explicit physical or conceptual tools, and symbolic content.

Socially constructed knowledge

Cognitive research conducted by scientists concerned with the social and cultural factors in learning conceive of all knowledge as being socially constructed, starting with language itself and ranging to the most technically sophisticated sorts of performance.

One cogent example concerns photocopier repair technicians and how they go about diagnosing non-routine problems and resolving them (Orr, 1987*a*, 1987*b*, 1988). By definition, these are problems that are not adequately covered in the cookbook procedures of the repair manuals furnished the technicians. The presumption behind these procedures is that technicians do not need detailed machine knowledge, that all the knowledge that is necessary to the technician's job is embodied in the repair manuals and step-by-step routines. Yet, machines fail unpredictably and in ways that are not foreseen by prescribed repair schedules and directive procedures, forcing the technicians to develop alternative channels of information.

At least two kinds of socially constructed knowledge enable technicians to make effective repairs in such instances: their exchange of information with customers (*e.g.*, what kind of use the machine gets, what other problems there have been, what preceded the breakdown, how to avoid it in the future) and "war stories" that is, anecdotes of their experiences shared among technicians. These stories are based on "the community memory of the technicians, in which they preserve and circulate their hard won knowledge of machine arcana. Other technicians called for purposes of consultation will bring their own recollections to bear, and a good memory will make one a popular resource" (Orr, 1988, p. 4).

Although there is other information available to the technician – for example, the error logs created by the machine itself and the logbook containing records of installation, use, and previous service calls – Orr concludes that "community memory is crucially important to the service task. Service is indeed about the maintenance and repair of machines, at least partially so, but a substantial portion of the work observed could be better described as maintenance and repair of the social context in which the machine exists" (Orr, 1988, p. 1).

It is interesting to note that the sharing of experience – the telling of "war stories" – is an aspect of their job that technicians appear to relish. Technicians will make it a point to meet for coffee or more extended meals when their work schedules allow and exchange anecdotes about unusual experiences with customers and machines. These stories almost never concern routine maintenance or problems that everyone knows how to fix. What makes the "war stories" powerful is that they deal with machine and customer behaviour within the context of a specific situation. In this regard, they not only

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provide new information that illuminates the workings of the machine but also specific applications of that information. The anecdotes amplify the technicians' community model of the machine and at the same time guide field work in ways that are useful for persons of differing levels of expertise, with different understandings of the model (Orr, 1987*a*).

Use of physical settings and tools

The photocopier technicians described by Orr construct problem representations from the environment comprising other humans and the machine itself, and they base their repairs on these representations. Suchman (1987, p. 50) terms such action, based upon its material and social circumstances, "situated action", meaning that "setting and activity mutually create and change each other; in the process, 'problems are generated and resolved" (Lave *et al.*, 1984).

Authentic work situations foster the use of situationally specific strategies, *i.e.*, using the setting and tools at hand to simplify the task so that least-effort activities will result in acceptable performance. A classic example of this kind of research is Scribner's study of workers in a milk processing plant (Scribner, 1986). She investigated three different types of jobs and how people performed them. The jobs were: *a*) assembling milk products, *b*) pricing delivery tickets, and *c*) taking inventory.

a) Product assemblers, classified as unskilled workers, were responsible for locating products stored in the warehouse and sending out to the loading platform the amount of each product ordered by drivers for their daily routes. Scribner found that assemblers departed from the literal format of the orders, filling identical case orders in a number of ways. Their procedures resulted in using the fewest physical moves per order, indicating that they used mental calculations and physical configurations to save themselves physical labour. The procedures were virtually error-free. When Scribner simulated this job using novices (ninth-graders), she found that they started out using literal strategies involving more physical labour, but acquired – without instruction – some of the more obvious labour-saving strategies within a few days.

b) Wholesale delivery drivers were responsible for determining the cost of their daily deliveries to customers, using standard delivery tickets, pre-printed with the customer's name and products usually purchased. Scribner found that they solved pricing problems with identical structure in a variety of ways, departing from the multiplication algorithm when that simplified the arithmetic required, solving problems without the use of pencil and paper or calculators, and shifting back and forth in different base-number systems. In job simulations, drivers modulated their pricing techniques in accordance with the presence or absence of computational aids, and the procedures they used to solve the same problems changed under conditions of calculator use, paper-and-pencil arithmetic, or mental arithmetic. Solution procedures varied by individual as well as by problem and by calculating device. Novices, however, tended to solve all pricing problems by algorithmic procedures based on either unit prices or case prices. Interestingly, on a paper and pencil arithmetic test such as those administered in school, drivers, whose on-the-job accuracy was near perfect, made many errors on decimal multiplication problems similar in format to their pricing problems.

c) Inventory men were responsible for assessing the quantities of some 100 products and accurately recording amounts on paper forms. They had a wide variety of strategies for determining case number, using combinatorial procedures that varied with array configurations which they mentally transformed in order to use multiplication shortcut methods of enumeration. Single cases were not used as the unit of count, although all counts were expressed on the completed inventory form in terms of case units.

Scribner argues that what appear on the surface to be very simple instances of practical thinking and problem solving emerge, when examined closely, "as an intricate and dynamic system organised by both factors in the world and subjective goals and knowledge" that is "simultaneously adaptive to ever-changing conditions in the world and to the purposes, values and knowledge of the person and the social group".

Conceptual tools

Scribner's research documents the disjunctures between the problem solving skills that workers acquire and use effectively on the job and what they have learned and can do in school. A caution is in order, however. The fact that people use the environment to solve mathematical problems more efficiently than through the use of school-learned algorithms does not negate the power of these algorithms. As computational requirements of a job increase beyond the chunking and pattern recognition capacities of an individual, problem solutions will of necessity have to draw on the type of declarative and procedural knowledge embodied in these algorithms and their use. Some current research has examined how people learn to combine situation-derived knowledge and more formally learned knowledge to carry out jobs that have increased in technical complexity because of the introduction of computers. This research has led to effective training programmes, described in later sections of this paper, for technologically sophisticated occupations in electronics and aviation.

Related research suggests that performance in more "mental" occupations also requires the use of tools in context, but in these cases, the tools are the knowledge structures and concepts employed by experts in specific domains. Brown, Collins, and Duguid refer to the algorithms and principles of a particular field of knowledge as conceptual tools, available for use as a situation requires. But like all tools, conceptual tools are of little value unless people know when and how to use them. As Brown and others observe:

> "It is quite possible to acquire a tool but to be unable to use it. Similarly, it is common for students to acquire algorithms, routines, and decontextualised definitions that they cannot use. Students can often manipulate algorithms, routines, and definitions they have acquired with apparent competence and yet not reveal, to their teachers or themselves, that they would have no idea what to do if they came upon [a situation outside school that called for their application]" (Brown *et al.*, 1989, p. 33).

They argue further that active use of conceptual tools deepens understanding both of the tools and of the world in which the tools are used, an understanding that continually changes as a result of this interaction: "Learning and acting are interestingly indistinct, learning being a continuous, life-long process resulting from acting in situations."

Induction into the culture

The same authors point out that the use of a tool, whether physical or conceptual, is shaped not only by particular circumstances but also by the culture of its users. These cultures vary from field to field. The subculture that characterises a profession or line of work, be it that of technicians who repair photocopiers or mathematicians at MIT, shapes the behaviours and actions of its practitioners. Most often, these cultures are quite different from the culture of the classroom, even for highly academic fields. For instance, mathematics as taught in school generally is based on an authoritarian model of knowledge transmission, with mathematical knowledge seen as certain, absolute, and unchanging, and the doing of mathematics characterised as precise, disciplined, neat, accurate, and leading to one correct answer (Mathematical Sciences Education Board, 1989).

Mathematicians themselves, however, see mathematics as the science of patterns and regard their work as the search for patterns – in numerical data, in space, in science, in computers, in other mathematical structures (numbers, geometric or algebraic structures, linkages to other patterns) (Steen, 1988). This search entails pushing beyond the immediate answer, using alternative solution paths and using shortcuts that are appropriate to the situation, just as do the workers in the milk processing plant. Learning how to use available and appropriate tools effectively, whether the tools are physical, symbolic, or social, is deeply influenced by the way that members of a community see the world. Their individual experiences and insights combine to create a culture in which novices must participate before they can become expert in using the tools of their profession or work place.

Summary

Research involving analyses of individual performance has resulted in greater attention to the several types of knowledge (and their structure and interrelationships) that competent individuals display. Research on situated learning and socially constructed knowledge highlights the need for providing a real-world context (both physical and social) for education and training intended to prepare people for the world of work. An optimal educational response melding these requirements would appear to be learning environments that make task knowledge and problem-solving procedures explicit and that provide for feedback and tutoring by more experienced co-workers.

In short:

- The analysis and distribution of complex tasks to allow shared performance (or its simulated counterpart) by less experienced and more experienced workers provides a highly effective learning situation.
- Thus, people build workplace expertise through the opportunity to participate, under the tutelage and mentorship of experts, in physical and intellectual tasks specific to a particular work setting.
- Thus situated learning enables them to use the social, symbolic, technological, and material resources provided by the work context to structure problems and problem solutions.

- The symbol manipulation and abstract thinking skills required in many technical jobs today are learned effectively through a combination of practice and explicit teaching in a meaningful context.
- The process of progressing from novice to expert takes time as individuals achieve increasing levels of understanding – of knowledge, procedures, strategies, and social interactions relevant to their work and of the subculture of the occupation or profession.

3. The dysfunctionalities of schooling

Research of the sort summarised above documents that people learn differently on the job and through experience than they do in formal school settings and, perhaps just as important, that they use what they know differently. As indicated by Scribner's work, it appears that many individuals are able to acquire arithmetic skills and generate their own efficient paradigms to solve arithmetic problems in the work context or in real life outside work. They develop these paradigms, which may be quite different and more efficient than the formal algorithms learned in school, both through watching other workers and through their own invention. Yet, they are unable to solve analogous problems that are posed to them in formal schooling format.

This is true even of some individuals who are otherwise quite illiterate. Carraher, Carraher, and Schliemann have studied the computational skills of children who sell things in the street markets of Recife, Brazil (Carraher *et al.*, 1985). These children accurately make frequent and quite complex mental calculations connected with their commercial transactions, but failed the same problems in a formal school-type test where paper and pencil are used. The authors concluded that "daily problem solving may be accomplished by routines different from those taught in schools. Attempts to follow school-prescribed routines seemed in fact to interfere with problem solving" (Carraher *et al.*, 1985, p. 28). These researchers saw their results as providing evidence for the thesis of Luria (1976) and Donaldson (1978) that "thinking sustained by daily human sense can be – in the same subject – at a higher level than thinking out of context" (Carraher *et al.*, 1985).

Carraher presented further evidence in a study that examined skill in mathematical scaling and scale drawing among Brazilian construction foremen with limited schooling. She contrasted their performance with that of Brazilian school students on similar tasks (Carraher, 1986, p. 527). The daily work experience of the foremen enabled them to outperform the students. Furthermore, the students failed to improve their performance on these tasks despite the use of the applicable proportions algorithm they had been taught. In a synthesis of her findings, Carraher interpreted these differences as arising from the different contexts in which the learning about ratios and proportions had taken place. This led her to suggest that the form of mathematics teaching typically occurring in the formal classroom tended to overlook the importance of meaning in mathematics. Without an appropriate emphasis on meaning, student performance was lowered relative to that of the workmen.

The suggestion that context influences performance applies more broadly than just to mathematics. A similar thesis is sustained by Sticht, who designed a "functional literacy" (FLIT) program for young recruits who entered the United States military with very low reading skills. The program was based on the regular military training manuals adapted to the reading levels of the recruits. They were thus able to start their military training right away, compared to the usual procedure of first enrolling them in six weeks of general literacy classes. The FLIT program also provided for various reading-related activities, using the adapted manuals, and computer-based vocabulary programs. When compared to a group of similar recruits who had gone through the traditional literacy program, the recruits in the FLIT program showed equal gains in general literacy, superior gains in job-related literacy, and additional gains in work-related skills and knowledge. The superiority of the gains in job-related literacy were substantial: in fact, Sticht found that "marginally literate adults in a job-related reading program made twice the gain in *job-related* reading than they did in general reading". They clearly did better when a meaningful context was provided for the text (Sticht, 1987).

It is interesting to note that these findings about performance based on experience outside the schoolhouse parallel the observations by Brown and others about the performance of "good" students in the classroom who are very adept at solving "textbook" problems but are unable to apply the appropriate algorithms to analogous non-school problems (Brown *et al.*, 1989). In each case, individuals function well in the context in which they have learned to address the tasks expected of them. The problem is that the context of the classroom is unique to school, and its pedagogy is based on several fallacious assumptions.

The skills hierarchy fallacy

For many students, the classroom does not present a meaningful context for learning. Schools present normative learning opportunities, which originally were created to enable students to gain general skills. The underlying assumptions of traditional schooling are that students need to acquire basic skills before they can develop further knowledge. It is assumed that, once they have acquired these basic skills, students will be able to transfer them to a variety of work and learning situations. Unfortunately, all too often, instruction in basic skills takes place through the practice of isolated subtasks in which the emphasis is upon satisfactory repetitive performance rather than on use in appropriate contexts. For students who are not immediately successful, there is little opportunity in many schools for genuine manipulation or reasoning using the very symbols that form the substance of the basic-skills instruction.

This pedagogy is based on more general practices in skills training, in school and out. These practices entail *a)* decomposing any competence to its smallest parts and teaching each part separately, on the assumption that, if each subskill has been learned, all the subskills can be put together and the competence will have been acquired; and *b)* teaching individual competences or skills out of context on the assumption that each will then be applied appropriately in context. Thus it has been a standard practice in education and training programmes to develop lists of needed skills or competences.

These are then related through some posited hierarchical structure which is decomposed into subskills to be taught one at a time until mastery is obtained, whereupon the next subskill in the hierarchy is taken up. The isolated subskills, often freed of any context, have become reified as individual "building blocks" of expertise to be used as the basis for instruction, either in the workplace or in school (*e.g.*, basic skills as a prerequisite to the learning of more complex skills). Yet, this decomposition and decontextualized teaching of skill hierarchies is seldom effective either in educating for general purposes or in training for work.

Not surprisingly, students emerge from school handicapped in the workplace where they face a changing world of complex technologies demanding the use of problem-solving skills that they have never had the opportunity to learn. To counter the seeming incompetence of these young workers, industries develop turn-key operations and step-by-step manuals that further disable students and workers by removing any possibility of their developing in-depth understanding of the problem-solving processes involved in their particular assignments. As Resnick noted:

> "Evidence is beginning to accumulate that traditional schooling's focus on individual, isolated activity, on symbols correctly manipulated but divorced from experience, and on decontextualized skills may be partly responsible for the school's difficulty in promoting its own in-school learning goals" (Resnick, 1987, p. 18).

The context of the classroom

It is not quite accurate to speak of school instruction as consisting of disembodied or decontextualized tasks, problems, or learning. Rather, school learning takes place in a context that does not resemble any situation most learners are likely to face subsequently. According to Brown *et al.*:

> Students need much more than abstract concepts and self-contained examples. They need to be exposed to the use of a domain's conceptual tools in authentic activity – to teachers acting as practitioners and using these tools in wrestling with problems of the world. Classroom tasks can completely fail to provide the contextual features that allow authentic activity. At the same time, students may come to rely, in important but little noticed ways, on features of the classroom context, in which the task is now embedded, that are wholly absent from and alien to authentic activity (Brown *et al.*, 1989, p. 34).

Since the classroom is a subculture of its own and removed from other occupations and professions, it becomes very difficult to model authentically professional subcultures in the schooling context. Although students may be provided with the tools of a particular occupation (physical or conceptual), they are rarely provided with opportunities to engage in the real-world tasks that characterise that particular occupation. Brown and others put the case as follows:

> When authentic activities [*i.e.*, the ordinary practices of an occupation or profession] are transferred to the classroom, their context is inevitably transmuted; they become classroom tasks and part of the school culture. Classroom procedures, as a result, are then applied to what have become classroom tasks. Consequently, contrary to the

aim of schooling, success within this culture often has little bearing on performance elsewhere (Brown *et al.*, 1989, p. 34).

The discontinuities between formal schooling and work discussed above can be summarised as follows:

- schools stress individual performance as contrasted to the socially shared performance that characterises most non-school settings;
- schools expect performance to occur on the basis of unaided thought, whereas work settings allow and, for higher-skills operations, require the use of cognitive tools;
- schools emphasise symbolic thinking to the exclusion of objects and situations that aid problem formulation and solution in real life and at work;
- schools attempt to inculcate general skills and knowledge as contrasted to the situation-linked knowledge and skills that make for effective performance outside of school (Resnick, 1987).

4. Marginalised populations

The widening gap between the aims of formal schooling and its accomplishments is especially detrimental to certain groups and populations. In the United States, these include non-college-bound students, students from economically disadvantaged backgrounds, minority group (especially Afro-American and Hispanic) students, and students who lack proficiency in English. When students suffer the disadvantage of both poverty and minority group membership, as many do, the problems they face create almost insurmountable barriers to success in education or in subsequent careers.

About 30 per cent of US high school students are enrolled in academic tracks preparing them for entry into four-year colleges or universities. Minority individuals and students from poor families are heavily overrepresented in the other 70 per cent of the student body. These students usually are thought of as attending either general or vocational education programmes. Although there is some overlap between the two, general programmes enrol about one-half and vocational programmes enrol about one-quarter of the total student population. In one sense, the three tracks are not rigidly segregated. According to one recent study, over 97 per cent of students take at least one vocational education course before they graduate from high school. However, while students from all tracks may sample the offerings of the vocational tracks, it is difficult for vocational students to break into the college track after grade nine (Wirt, 1989; Oakes, 1986). When students cross the tracks, they are usually moving to the "wrong" side.

In fact, with respect to curriculum, there is little to distinguish between students in the general track and students in the vocational track. On average, most students spend about 80 per cent of their time in academic courses and 20 per cent in courses classified as vocational. With rare exceptions, however, the "academic" courses for students in general and vocational education programmes are "watered-down" versions of courses designed for the academic track. The recent education reforms emphasising greater rigor

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in the high school curriculum have not much affected these students. While there has been an increase in enrolments in academically challenging high school courses over the last decade, the students involved have come from the upper ability spectrum, probably motivated by rising requirements for university entrance.

Because of the openness and diversity of the US higher education sector, some of the general and vocational education students do enrol in post-secondary institutions, albeit in less demanding and less prestigious ones. But many students emerge from their high school education – even when they complete it – without the skills necessary for either further education or employment. As a result, some 20-25 per cent of recent high school graduates not enrolled in college who were seeking work could not obtain employment in the 1980s (US Department of Education, 1988).

The majority of young people do get jobs, but many of these are deadend. According to 1981 data gathered by the National Longitudinal Survey (NLS) of Youth Labor Market Experience, 87 per cent of jobs held by young people aged 16-21 required less than three months training, and only 21 per cent required even as much as a high school diploma or some college level training (Sherman, 1983, p. 8). As the author points out, however, these data should not be taken as a guide for the kind of education that ought to be provided to young people: jobs for which they may wish to compete later in their career are likely to require more education and training than those offered to them when they are 16-21 years old.

Vocational education is intended to connect the learning of general skills with the acquisition of job-specific skills, albeit in the formal school setting. The opprobrium attached to this track is considerable. Students, seemingly having opted for work rather than college, are regarded as second-class citizens in the comprehensive high school, as are their teachers (Oakes, 1985). Perhaps this is why so many of them choose to be identified as "general" rather than as "vocational" students. And in truth, if the effectiveness of vocational education programmes were to be judged by the career success of its products, then the verdict would at best be equivocal (Grasso and Shea, 1979). Graduates of vocational programmes appear to do no better in finding jobs than their peers coming from other programmes (Mertens *et al.*, 1980). In the case of California, for example, they do no better than high-school dropouts (Stern *et al.*, 1986). Moreover, the National Assessment of Vocational Education concluded that the achievements of most vocational programmes in improving students' academic skills are poor and that considerably fewer than half of all vocational education students obtain good jobs related to their vocational training (Wirt, 1989, p. 8).

Even in terms of providing equal access, vocational education does no better by minority and low-status individuals than does general education. The National Assessment found that the quality of vocational education available to students in poor schools is significantly lower than that available to students in more affluent communities. Students in schools in the lowest quartile, as measured by average family income, student academic ability, and socio-economic status, are half as likely to have access to an area vocational centre as other students. They are also in schools with less than half the number of advanced vocational courses (Wirt, 1989, pp. 7-8). These disparities continue at the post-secondary level. On average, black students earn 30 per cent fewer credits at

two-year community colleges than do white students and 51 per cent of them leave before completing the programme in which they are enrolled. Drop-out rates also are significantly higher for the most economically disadvantaged students, regardless of race (Wirt, 1989, p. 13).

Despite being enrolled in full-time schooling, a large number of 16- and 17-year-olds also are active in the labour force. Nearly 40 per cent of this age group are either employed or looking for employment (US Department of Education, 1988). Does their employment encourage them to take their school work more seriously and thus help them acquire skills and attitudes that employers value? In most cases, the answer is "no". The Committee for Economic Development concluded as follows:

> Employers in both large and small businesses decry the lack of preparation for work among the nation's high school graduates. Too many students lack reading, writing, and mathematical skills, positive attitudes toward work, and appropriate behaviour on the job. Nor have they learned how to learn, how to solve problems, make decisions, or set priorities. Many high school graduates are virtually unemployable, even at today's minimum wage (Committee for Economic Development, 1985).

The continued failure of school to provide minority students and students from low socio-economic backgrounds a functional education is especially distressing in the face of current demographic changes. Minorities – Blacks, Hispanics, and Asians – are projected to account for nearly 60 per cent of labour force growth in the United States over the next decade. Also, unless current social trends are reversed, more young people will be coming from unstable homes and community and family conditions of poverty; others will be disadvantaged because of their inadequate knowledge of the English language. Unless their education and training, wherever its venue, can be made to serve them better, both the individuals and the country will pay a severe economic and social price.

5. Designing programmes that work

The accomplishments of cognitive research over the last 25 years have important implications for bringing about the needed improvements in how schools work (Glaser and Bassok, 1989). Investigations based on *analyses of competence*, including the identification of differences between novices and experts, have made possible the formal modelling and simulation of complex cognitive performance, leading to a number of successful education and training programmes. A major finding is that it is not sufficient to teach knowledge and procedures; instruction must also focus on conditions of application of the knowledge and skills being learned.

The debate among cognitive psychologists as to the importance of *domain-specific knowledge versus generalisable skills* is being resolved through better recognition of the role of each (Nickerson, 1988). It appears that the process of becoming an expert is not linear and, for most occupations or professions, cannot be divided up into a number of discrete skills that can be taught in isolation. Theories of learning are being constructed to accommodate the importance of domain specificity and yet take advantage of the utility

of general heuristics as well as meta-cognitive, self-regulatory skills. Current research indicates that:

- Instruction must intermingle context specificity and generality, including the development of self-regulatory skills and performance control strategies. Research on what *knowledge and skills the learner brings to instruction* has provided new insight on what makes instruction effective. Instead of constructing curriculum top-down by encoding the knowledge of experts in suitably simplified materials, instruction should take into account the learner's original ideas, stage discrepant or confirming experiences to stimulate questions, and encourage the generation of a range of responses with the opportunity to apply these in various situations. Researchers concerned with how people actually move from their *initial state of knowledge and skills to effective performance* in work settings are uncovering the importance of learning in context.
- The most effective learning takes place through "situated activity", using the physical environment and the tools it provides, the co-operative construction of knowledge among groups of workers doing a common task, and the culture of the specific work community.

How can these principles of instruction be applied? What settings lend themselves most readily for their effective implementation? Can they be integrated with traditional school subjects, with vocational education, with formal work-related training courses? What changes would need to be made in the current arrangements for vocational education, in its curricular content, and in its pedagogic strategies? Should such instruction be offered in work settings, through modern forms of apprenticeship, or integrated with on-the-job training? How would work arrangements have to change to facilitate an effective equivalent of apprenticeship training? How would informal on-the-job training have to be restructured to educate effectively for expert performance?

Formal educational settings

A strong argument can be made that, given appropriate pedagogy, formal educational settings are the most effective for learning of general symbolic and cultural knowledge. Yet, many students are disengaged from their schoolwork; they often explain this disengagement on the basis of the irrelevance of what happens in the classroom to anything that happens in the real world. From their perspective, they need connections to what matters to them (Newmann, 1990, pp. 2-3):

i) an understanding of the value and use in the real world of what they are asked to learn in the classroom;
ii) clear, prompt feedback that tells them about the quality of their work and how to improve it;
iii) opportunities to collaborate with peers and experts;
iv) flexible use of time.

These needs of students map well onto the pedagogic principles summarised in the preceding section.

In an attempt to provide a more authentic work setting, some vocational programmes adopt a project method, say, building or rehabilitating a house. More often than not, however, this sort of approach is doomed to failure: the school cannot really model operating conditions, constraints, criteria for evaluating and rewarding performance, or social relationships in the relevant trades. Moreover, while the project method has the potential for being a fertile setting for learning, it requires highly skilled teachers – rare in any field – to take full advantage of this opportunity. All too commonly, the project method either results in a form of disguised chaos, in which students learn little about the "what" and less about the "why" of what they are doing, or it simply replicates in another form the didactic teaching of the academic classroom.

As a consequence, the Committee for Economic Development has levied a serious indictment:

> Many "vocational education" programs are almost worthless. They are a cruel hoax on young people looking to acquire marketable skills. So many different and, in many cases, unproductive programs in our public schools have been called "vocational education" that most existing programs need to be disbanded and reshaped (Committee for Economic Development, 1985).

Despite such general criticisms of vocational education, some programmes and technical schools do succeed in providing an education to young people that prepares them to be successful at work or to continue their education beyond high school, as they choose. Mitchell and others studied nine such schools or school programmes (Mitchell *et al.*, 1989). They found that these exemplary schools were characterised by some of the same general attributes that make any urban high school effective: a safe and orderly environment, a businesslike attitude among students and teachers, a warm and caring school climate, and high expectations for the students. But in addition, the successful schools forged strong linkages with business and industry, which permitted them to organise curricula around an industry and integrate theory and practice. Students gained solid exposure to the workplace; they came to understand the need for a sound education; and this education, without being watered down, was linked to challenges they faced during their work experience.

These schools learned how to create a context in which students can succeed. According to Mitchell *et al.*, graduates "have a range of choices for life after high school: four-year college, professional institutes, two-year college, a job with career prospects, or a combination of college and work" (Mitchell *et al.*, 1989, p. 107). The authors commented that, because of their very success, these exemplary schools were short-changed in the allocation of moneys available for vocational education, surely a perverse incentive system for building programmes and schools that work. Apparently, not only must curricula and instruction be changed in most vocational programmes, but so must policies that currently govern them, at least in the United States.

Formal training courses

As work has become more complex, training courses sponsored by employers have come more and more to resemble traditional academic courses. This may be appropriate for middle- and upper-level employees – indeed, the very employees who, in the United States, benefit the most from employer investment in training. However, it perpetuates failure for the very populations whom the schools also failed, and for similar reasons.

A contrasting example is the innovative employment-based training programme designed by Sticht and others for the United States military. Sticht's objective was to develop an experimental course to prepare at-risk youths and adults with inadequate backgrounds to become electronic technicians (Sticht, 1987). His intake group comprised males with low literacy skills – at 5th through 9th grade level – and females with low technology skills. The course was based on two principles derived from military training research and from cognitive science, namely, that:

> "expert electronics technicians draw as much or more on 'mental models' of electrical appliances, equipment, or 'systems' as they do on traditional electronics theory when they troubleshoot complex systems. Hence, instruction should develop mental models for understanding equipments as systems. Basic skills (literacy, mathematics, problem solving) are interrelated capabilities that draw upon a common knowledge base in the cognitive system. Hence, improvements in basic skills occur from better knowledge in a subject area; better basic skills can then be used to acquire more subject-matter knowledge" (Sticht *et al.*, 1987, p. 185).

Yet, technical training programmes in both military and civilian settings tend to screen people using basic skills tests and to teach basic skills as prerequisites. This results in the "front-loading" of basic electricity and electronics courses accompanied, when deemed necessary, by decontextualized basic-skill or literacy programmes before any of the students get hands-on experience. In contrast, Sticht's experimental course explicitly went from the concrete to the abstract, from the specific to the general, from practice to theory, and from the familiar to the unfamiliar. In order to develop mental models of electronic equipment, the course started with hands-on instruction using simple and familiar electrical equipment: flashlights, table lamps, curling irons, portable radios and tape players. Students explored the devices, starting with the flashlight, in hands-on fashion, then worked along with the instructor to learn how to examine the equipment, think about it as a system, and understand its functions. Reading, writing, diagramming, mathematics, problem solving, and troubleshooting were integrated into the teaching of technical knowledge. As the course progressed, more abstract representations and complex calculations were introduced, always in a functional context. Sticht reports that the students, who otherwise would most likely have been screened out of traditional electronics training, were learning both basic electricity and electronics and basic skills (Sticht, 1987).

The author's conclusions about the nature of effective courses match the general pedagogic principles summarised in the preceding section. Students learn when courses *i)* use the knowledge that students bring with them to build new knowledge; *ii)* integrate the instruction in domain-specific knowledge and skills with reading, writing, arithmetic, and use of problem solving strategies rather than offering decontextualized basic-skills

remedial programmes, and *iii)* use learning contexts, tasks, materials, and procedures that mirror as closely as possible subsequent work tasks and situations, so that students are clear about what they are to learn and why.

Reform of vocational education

Traditional, school-based vocational education is under attack in the United States from two directions: first, the drive for "excellence" which stresses increased enrolments in academic courses and already has resulted in a serious erosion of vocational education programmes in many high schools (Clune *et al.*, 1989; Selvin *et al.*, 1989); and secondly, the experimental apprenticeship and other work-based programmes being piloted by the US Department of Labor and various industry-based associations. Interestingly, the vocational education community in the United States is countering these threats to its existence by joining the current movement for greater emphasis on academics, generally through calling for integration of academic and vocational courses (Bottoms and Presson, 1989; Rosenstock, 1991).

Legislation passed in the fall of 1990 (The Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990) extends federal support of vocational education through 1995 and makes special moneys available for the integration of vocational and academic education. As described in Chapter 3, it also promotes the articulation of high school courses with two-year associate degree programmes in community colleges through what are known as tech prep programmes (Wirt, 1991; Hull and Parnell, 1991). Parallel efforts are under way in France to create a new *Baccalauréat professionnel* that would enable students studying more vocationally-oriented courses to obtain the equivalent of the traditional academic *Baccalauréat*, the secondary school graduation certificate traditionally recognised by industry as certifying proficiency in valued knowledge and skills.

The objective in the United States is similar: to upgrade the second-class status of vocational education in the secondary school by providing an academic curriculum equal in rigor to the college-preparatory track, but presented in the context of "experience in and understanding of all aspects of an industry" (Rosenstock, 1991). Thus, agriculture students would study soil chemistry, botany, marketing, and financing and cash flow as well as traditional skills in how to run a farm; automotive students would study the history of the automobile, the transportation industry, and scientific principles of engine design and fuel economy as well as the traditional repair skills. There is evidence that a concerted approach to integrating a core academic curriculum with technical instruction in a particular field can improve school performance, especially when there are strong links to local industry: vocational students in ten special high schools using this model in California took more courses and received better grades than their peers elsewhere (Stern *et al.*, 1988); they also completed school at a greater rate (Stern *et al.*, 1989). The evaluators found, however, that success was by no means assured; not all the schools produced improved student outcomes. They conclude that replications of what appear to be successful model programmes must pay heed to the factors that created the success of a particular programme and must carefully implement all of them.

Vocational education is seen as particularly useful in instilling the entrepreneurial spirit needed to start new businesses and to provide skills training for their owners and employees, including management and communication skills. Businesses started within the last five years currently employ between 15 to 20 per cent of the US labour force (Vaughan, 1991); since most of these are small, they are unable to provide in-house training and need to rely on school-based training. Economic development projects within the low-income communities from which many of the students come represent a related approach to vocational education reform and also provide a vehicle for integrating it with academic education; this approach adds the goals of job creation and development of local enterprises to the goal of educating students.

Apprenticeships

Anthropologists have investigated how individuals in nonliterate cultures learn complex skills. For example, Jordan spent a number of years studying the practices of traditional birth attendants in Yucatan and the failures of training in western medicine provided to them, resulting in higher infant mortality (Jordan, 1989). She drew the following contrasts between learning based on watching and imitating the behaviours of more experienced practitioners (traditional apprenticeships) and didactic teaching of abstract knowledge (formal education):

- Apprenticeship happens as a way of life, with almost no separation between daily activities and learning of professional skills.
- Activities are organised around the work that must be accomplished, with mastery appreciated for its immediate use and value rather than as a step toward a certificate or the next level of learning.
- The order of skill learning in apprenticeship tends to be from the periphery to the central activity, but it does not proceed in a linear, chronologically ordered sequence, nor is it predetermined by the order of acquisition of other skills.
- Performance lies in the doing of something rather than talking about it, talk being incidental to the activity.
- Evaluation of the learner's competence is implicit rather than explicit and/or externally imposed, effective performance being obvious to both master and apprentice.
- The master, unlike the teacher, is only a small source of the knowledge being learned; little identifiable formal teaching is going on.
- Stories are used to share experiences, enlarge the fund of knowledge available to the group, and legitimate members of the craft.

There is much to be learned from this characterisation of traditional apprenticeship. Which of the learning characteristics are immediately adaptable to today's world of work? Which are appropriate but would require major restructuring of both schooling and work? Which do not appear feasible or productive? Clearly, major adjustments will be needed, since all too many young people lack the skills to obtain jobs, let alone be able to learn from the work situation in which they find themselves. The following examples illustrate some dilemmas and some solutions.

From transparency to representation

One major problem with learning by doing in today's world is that much of the modern environment of many jobs as well as of ordinary life is made up of "black boxes" or operations that cannot be observed directly. Microchip circuitry, electronic controls, and modern telecommunications have rendered the workings of the physical and social artefacts in many work contexts impenetrable to every-day "common sense". This was not true in the pre-industrial training of apprentices for various crafts, nor is it true of midwives in Yucatan today or of some manufacturing plants in less developed countries.

For example, in a traditional apprenticeship for training tailors, every phase of garment production was quite explicit, easily observable, and could be imitated by the apprentice without detailed instruction. Moreover, the machinery used in training was inexpensive and easy to repair (Lave, 1977). By contrast, modern textile plants use sophisticated machines that are easy to operate, but whose expense makes it imperative that machine damage be avoided. Machine repair can no longer be a hit-or-miss affair learned through experience on the floor. Furthermore, the quality of the output is not readily discernible by the workers, as it was formerly, and jobs are less well defined.[1]

The modern solution to the black-box nature of physical artefacts is to provide detailed, pre-formulated instructions on operational or troubleshooting procedures (as with the technicians' manuals for photocopier repair) without attempting to engender an understanding of the artefact's context or its workings. The danger of this approach, aside from its futility in the face of non-routine occurrences, is illustrated by the events at Three Mile Island. The accident which occurred there can be ascribed to the "dumbing down" of training. The instruction provided to operators did not integrate theory, systems knowledge, and site-specific operations and procedures, as Sticht and other cognitive researchers advocate. The body investigating the accident, *The President's Commission on the Accident at Three Mile Island* (Volume III), concluded that much of the fault lay with the inadequate training programme:

> The replacement operator programme which prepared reactor operator candidates for licensing was done essentially on a self-study basis. Although nine months were devoted to this programme, little emphasis was given to theory, application of the theoretical to the practical, or principles of operating and casualty procedures. Emphasis was on systems, equipment, and procedures. Operator trainees were not provided with a fundamental, comprehensive understanding of their reactor plant design and operation which would enable them to recognise the significance of a set of circumstances not explicitly predicted by the operation procedures and which would lead them to place the plant in a safe condition. Essentially, operators learned how various pieces of equipment worked, how plant operating and safety systems worked, and how to apply preconceived, stepwise procedures to various abnormal and emergency situations. In other words, they were dependent upon "the manual". They were not taught or expected to know how or why a specific nuclear power plant would respond to different types of failures and lacked the basic understanding necessary to deal safely with what was, in fact, a relatively minor failure when it occurred.[2]

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In such a complex environment, it is not a question of either practical knowledge or theoretical knowledge. It is more a matter of blurring these artificial distinctions so that apprentice workers are provided with an opportunity to understand the problem-solving tasks that confront them. Apprentices need opportunities to gain both practical experience and situationally specific, theoretical understandings in a combination of ways (*e.g.*, provided on site, through simulations, or through formal instruction) that are relevant to the specific work situation.

Lesgold and others, discussing the training of jet engine mechanics and avionics technicians, recommend: "more troubleshooting diagnosis practice, practice in making diagnostic decisions, not just carrying out the physical steps dictated by someone else's decisions" (Lesgold *et al*, 1986). The presumption is that such practice will reveal a variety of problems, the resolution of which will engender a deeper understanding of the complex machine and its operation in context. Suchman states the proposition as follows: "In the course of situated action, representation occurs when transparent activity becomes in some way problematic" (Suchman, 1987, p. 50). In Orr's studies, for example, during normal operations, the workings of the machine and its use are taken for granted and of little interest, that is, they are "transparent" – there is no particular reason to observe or think about them. The operations manual and routine procedures suffice for maintenance. It is only when something goes wrong that people need concern themselves with how the machine functions. It is at this point that the customer has to describe the nature of the malfunctioning (*i.e.*, the customer's representation of the problem), thus helping the technician figure out what might be wrong (the technician's representation of the problem). Concludes Orr: "the art of diagnosis lies in producing the right pieces of information creating a concise, coherent representation of the troubled situation such that it can be repaired and return to transparent [*i.e.*, trouble-free] operation" (Orr, 1988, p. 6).

All the notions discussed in this paper regarding successful performance and learning tied to successful performance – the development of expertise, socially constructed knowledge, use of the environment to formulate and solve problems, induction into the culture – point toward some form of apprenticeship as one reasonable way of educating for work. Apprenticeship is socially and contextually situated and combines the learning of specialised and general skills. Yet, as Resnick points out:

> "In America, as the nature of the workplace changed [during the industrial revolution], we gave up opportunities for learning in the workplace in favour of school-based vocational education. School-like forms of instruction now dominate even in many 'on-the-job' training programs. In the military, in community colleges, and in proprietary training institutes, the classroom culture often dominates" (Resnick, 1987, p. 17).

If apprenticeships are to flourish again, however, they will need transformation to match modern work, where the whole process generally cannot be modelled for the apprentice in a very overt and physical way. Obviously, most modern jobs, whether in manufacturing or in the service industries, whether in the private or public sector, do not have some of the attributes that made traditional craft apprenticeship so effective – the high visibility of the different skills needed to create a quality product or render an

effective service, the clarity with which different tasks fit together, the obviousness of effective performance. Therefore, modern apprenticeships need explicit tutoring, error correction, and evaluation components, provided when possible by experienced coworkers or "experts".

Learning from error

Seifert and Hutchins point out the advantages of learning from error which good apprenticeships provide: "Systems of co-operative work always rely on learning on the job, and where there is the need for learning, there is potential for error" (Seifert and Hutchins, 1988). This is particularly true in a work setting like the United States Navy, where changes in enlisted personnel occur with great frequency. Yet, the navigation system overall must be virtually error-free, even though perforce it keeps replacing experienced personnel with new recruits. Thus, the co-operative work of the navigation team must, at one and the same time, try to avoid errors and take advantage of those that do occur, using them for training purposes so as to minimise future errors. Learning from errors requires explicit design: "In order to benefit from errors [they] must be detected, diagnosed as to their cause, and corrected with useful feedback" (Seifert and Hutchins, 1988, p. 4).

This is facilitated in the navigation training system by the fact that the individuals detecting an error made by the novice have themselves been in the novice's position and understand the situation that gave rise to the error. The more experienced individuals of the team generally will have a good idea of why and how the novice went wrong and how to provide corrective feedback. In the process, both the learner and the tutor extend their knowledge of the overall system. It is the distribution of knowledge and overlapping responsibilities among team members that makes error detection, correction, and learning from error so effective. Not only do novices learn through error, as they are corrected by more experienced team members, they also learn to identify their own errors and the errors of others. This gives novices much greater opportunity for acquiring relevant knowledge.

By participating in the process of error-based learning as a performer, an observer, and a teacher, the novice increases the number of learning experiences available for acquisition and deepens understanding of the lesson through interaction in several participatory roles. In addition, other learners provide models of the learning process itself, and this meta-knowledge may be helpful to novices in forming expectations about their own performance (Seifert and Hutchins, 1988, p. 11).

Of course, the kind of apprenticeship system that builds learning from error into its training strategies comes at a cost. In navigation, the cost is overlap and redundancy – a cost deemed worth paying, given the turnover of personnel and the need for virtually error-free performance of the overall system at all times. By design, individuals not only experience and therefore understand every phase of the complex co-operative task, but they also are expected to correct and guide less experienced members of the team. In most work situations, on the other hand, more skilled employees do not necessarily understand the responsibilities and specific subtasks of the less skilled workers also contributing to a common task. And in the trade-off between attending to their own work

and helping others with their learning, employees are rarely rewarded for the latter; more likely, they will be penalized for taking time away from their own tasks.

Effective apprenticeships

In sum, training programmes – whether in or out of school – need to focus upon providing opportunities for apprentice workers to experience real-life working situations in which they can gain both practical and theoretical knowledge in their chosen trade or profession. In order to provide this experience, simulation programmes may be required to replace real systems where the actual context and equipment cannot be duplicated or where risks cannot be taken with the real system (*e.g.*, nuclear power plants, aircraft pilot training).

Within real-life settings, apprentices need opportunities to address ill-defined problems, construct meaningful problem-solution relationships, and create multiple solutions. It is important to emphasize that apprenticeship must be more than just hands-on experience: apprentices in modern work settings need opportunities to collaborate with highly skilled workers and teachers who can provide guidance and explanation as the situation warrants. Skilled coworkers can provide specific information, common sense understanding, and practical advice. More formal teaching occasions can facilitate learning or provide complex technological training through direct instruction which is grounded in the specific problem-solving situation faced by the apprentice.

As the problem-solving skills of apprentices become more sophisticated, there should be opportunities for skilled workers or teachers to collaborate with them on advancing the job-related knowledge of both expert and novice alike. personal and shared practice can be discussed and legitimized, and new procedures can be "invented". Apprentices can be encouraged to use their creativity and ingenuity to think (theorize) about the nature of the problems they face in their jobs and about the application of their knowledge to future problem-solving situations.

Brown and others stress the importance of collaborative learning to their conception of effective apprenticeship, since working in groups promotes the social interaction they consider necessary to authentic induction into a trade or profession (Brown *et al.*, 1989). For one thing, working in groups encourages the collective solving of problems, which not only draws on the individual knowledge of all the group members (including the apprentice's) but also allows the apprentice to participate in developing new insights and solutions that are the product of the group as a whole. Second, group work allows novices to observe and understand the tasks and responsibilities of the more experienced group members, discuss these different roles, and perhaps even try out some of them. Third, more experienced members of the group can help the apprentice to confront ineffective strategies and misconceptions, as demonstrated in the navigation example. Particularly if the quality of the product or service of the group as a whole is adversely affected by a novice's errors, groups can be very effective in drawing out, confronting, and correcting inappropriate responses, misunderstandings, and ineffective strategies. And fourth, apprentices working in groups comprising a variety of expertise and responsibilities, in contrast to individual performance stressed in school, will acquire collaborative work skills, needed more and more in the workplace. There are very few work situations that

do not involve people learning and working in conjunction with others; hence, becoming proficient in the requisite social skills is as important as becoming expert in the practical and theoretical knowledge skills. Effective apprenticeship promotes all three sets of skills.

Learning on the job

In contrast to planned apprenticeship programmes, much of the acquisition of job-specific skills takes place in an informal manner at the work site. Little is known about the pedagogic strategies or the educational effectiveness of such informal training.

Entry-level training

Scribner and Sachs studied the training of stockroom workers in an electronics manufacturing plant which had recently installed a database computer system to manage inventory levels (Scribner and Sachs, 1990). Although this change increased the mathematics and literacy skills needed by stockroom workers, they continued to be classified – except for the highest ranks – as unskilled workers.

The company expected new hires to be trained by the experienced workers, although "training" was not part of anyone's job description and definitely subsidiary to work. It should not be surprising, therefore, that training revolved around work and was influenced more by the ongoing workload of the stockroom than the needs of the incoming worker. Nor was there an explicit training curriculum or plan, even regarding the length of training required. Nevertheless, trainers uniformly reorganized their work to facilitate the newcomer's understanding of the tasks to be done. Instead of carrying out activities as usual, *i.e.*, organized around actions using the same type of equipment (scales, or computers, or manual record keeping), trainers apparently instinctively switched to sequential handling of a part from start to finish to allow the trainee to observe the whole process. This ad hoc training was effective in providing initial levels of competence but did not deal with unusual situations. Although new employees, by their presence, were able to observe how experienced workers solved non-routine problems, there was no concerted attempt to teach them troubleshooting or other advanced skills that entailed a fuller understanding of the computer system that managed the inventory, or how the inventory related to production. The failure to teach these more general understandings and problem-solving skills highlights the limitations of the training procedure, particularly since, in the short training period involved, it was unlikely that new workers would run across every conceivable contingency. The researchers concluded that the informal training they observed is powerfully effective to satisfy the company's immediate performance requirements but may not support a worker's long-term career development.

Upgrading skills

Martin and Scribner investigated the cognitive changes demanded of workers as they had to make a transition from one set of technology-based skills to another (Martin and Scribner, 1988). They investigated the introduction of computer numerical control (CNC) systems into machining. In CNC systems, the computer programs express the manual

movements of the machinist as notations in Cartesian coordinate space to control the machine tools. Thus, the operators must learn to provide coded instructions to the computer rather than operating the machine tools to manufacture a part; the need for manual and sensory skills to turn out machined parts has been transformed into the need for skilled symbol manipulation. But CNC systems require more than that: action-based procedures and routines appropriate for manual work must be replaced by conceptualizations. Traditional machining allows problems to be addressed as they unfold while actually operating the machining tools. With CNC, sequential steps must be conceptualized and formalized because of the explicit symbolic language required in programming. Machining operations have to be planned by visualizing machine movements in Cartesian space; and feedback is based on logical cues rather than sensory ones. Each of these changes in skill requirements raises the question as to whether, in the future, the classroom or the factory floor will be the more effective setting for learning.

Workers with the skills required in such firms are in short supply. Vocational schools by and large have neither the equipment nor the staff to meet the training needs. Martin and Scribner report that, as a result, employers have been providing on-site practice, in addition to subscribing to vendor programs. The vendor-provided training often begins in the factory, with the programming of an actual job. This may or may not be followed up with more intensive training in a classroom setting. Interestingly, in a number of cases, it is the less experienced workers and non-machinists who are being trained, perhaps on the theory that they will have less to "unlearn". Once a plant has a worker experienced in programming, he becomes responsible for training others. Particularly in smaller plants, workers may be learning the new technology even as they operate the machines.

Effective on-the-job training programmes

Although the costs often are ignored, on-the-job training is not necessarily cheap. In a recent study of training costs, Puterbaugh and others examined both the amounts spent by industry on formal training programmes as well as the hidden costs of informal training procedures, that is, procedures that rely on peers and supervisors, training manuals, and simple trial-and-error learning (Puterbaugh *et al.*, 1989). The hidden costs also include the loss of productivity of supervisors and peers and the wastage resulting from errors and inexperience. They concluded that the hidden costs of training are significantly greater than the amount officially spent on formal training.

The United States National Alliance of Business (NAB) has undertaken a two-year demonstration project to develop work-based learning systems combining formal instruction and structured on-the-job learning (Komatsu, 1990). NAB advocates that the following principles should guide the prototypes to be developed:

- Learning is to be treated as an integrated whole, using different settings and media.
- Instruction should support the organization's strategic goals linked to a strong management system including regular evaluation of trainees' progress and continuing learning opportunities.

- Instruction should address skill or knowledge deficiencies of individuals; it is not an appropriate remedy for structural deficiencies in job design, work setting and organization, wage scales, and the like.
- Instruction should be based on specific job performance profiles, developed with the help of experienced employees and others (like sales staff and customers) involved with the task or product.
- Performance should guide the design of instruction as well as be the ultimate test of learning.
- The learning plan should be continuously adapted to address changing job conditions, based on conceiving of learning as a lifelong process.

These principles are intended to address the intersecting needs of the employer and the employee: the need for increased productivity for the employer, including enhanced pay-off for investments in training; and the need for continuing skills and knowledge acquisition by employees so that they can become valued members of the organization's workforce and advance in their careers.

6. Issues and implications

If one accepts the findings of cognitive science on how people learn to become effective workers, then three questions need to be addressed in developing effective education and training programs:

- What kinds of learning experiences need to be provided to young people, especially the large majority not interested in continuing formal academic education after compulsory schooling?
- What settings and structures are best suited to provide the appropriate mix of learning experiences? How do existing settings need to be modified so that they will enable the needed learning experiences?
- What are the systemic barriers to creating the necessary structures in schools? In places of work? What kinds of procedures need to be instituted to overcome these barriers?

Necessary learning experiences

The hallmarks of successful learning situations have been described several times in this paper: (see also Collins *et al.*, 1989).

i) Any learning experience must be meaningful and motivating to learners; they must be able to make sense of it and understand its purpose.

ii) Individuals come to any learning experience with prior knowledge and experience which may either facilitate or impede the intended learning; therefore, any learning experience must take into account what the leaner brings to it.

iii) Most people learn best when declarative knowledge (the "what"), procedural knowledge (the "how"), and strategic knowledge (the "when") are integrated.

Therefore, learning experiences should interweave domain knowledge, problem-solving strategies appropriate to the domain, and real-world applications of both.

iv) Learners must be actively involved in their own learning, even as they are provided models of expert performance to emulate. They need coaching and error correction, arranged to "fade" so that they become autonomous and independent.

v) Learning sequences should introduce increasing complexity, yet students should learn, at any level of complexity, to attend to the general nature of a task before attending to its details.

vi) Learning experiences should go beyond domain-specific learning to teach strategies for controlling one's own performance – setting goals, planning, checking work and monitoring progress, and revising one's course. Most important, learners need to develop strategies for acquiring additional knowledge and expertise.

vii) Learning experiences should enculturate the learner into the community of participants in a given domain or occupation, so that the individual will come to understand the physical, conceptual, symbolic, and social tools of the community and their uses and will become a contributing and valued member.

Appropriate settings and structures

Several of the characteristics of effective learning experiences point to the workplace as the appropriate setting; others would seem to favor the classroom. For example, with respect to motivation and sense-making, learning how to do one's work effectively while minimizing effort is highly motivating; the application and benefits of one's learning are immediate. "Situated" or "contextualized" pedagogy that integrates domain knowledge and procedural knowledge and the application of both to tasks which model as closely as possible real-world conditions is a given in the workplace; it is more difficult to arrange in the classroom and sometimes altogether infeasible. Enculturation into a community of experts within a domain or occupation is most readily accomplished in the workplace. On the other hand, it is unlikely that the careful attention to the learner's needs could easily be achieved in most workplaces in the United States today. Such attention to individual needs is in fact characteristic of the induction of novices in such high-status professions as medicine, law, and academic scholarship, but in most workplaces it would be necessary to establish quite different structures for the training of incoming workers than apply at present. The management of one's own performance seems, a priori, teachable in either the school or work context, though the pay-offs for learning these skills may appear greater and certainly more immediate in a work situation, especially given today's requirements for worker initiative in problem solving.

This sort of analysis would lead one to conclude that learners ideally should participate in some combination of formal, school-based learning and work experience. The work experience needs to be well structured: it should be linked to an educational institution and expressly designed to provide situated learning and participation in an

accomplished work group. In fact, looking across relevant practices in the United States and in other OECD countries, one can document examples exhibiting several of the characteristics of such successful learning situations. These examples take three forms: school-based programmes; apprenticeships and other combinations of school and work; and on-the-job training designed to maximize both work productivity in the long run and individual learning in the short run.

These three modes represent somewhat different philosophical positions: The primary concern of the school is the development of the individual, preparation for work being only one aspect of this development. The primary purpose of on-the-job training is work productivity, with concerns for individual development playing a supportive role. School-work combinations and apprenticeships fall somewhere between primary concerns with individual development and primary concerns with work productivity. These philosophical differences play out quite differently in the different OECD countries. There is, for example, a long tradition in the German-speaking countries of commitment by private firms to the education and training of young people through an apprenticeship model that entails close co-operation with educational authorities, *Länder* governments, and the unions. All four parties are involved in setting performance standards for apprentices and trainees.

In the United Kingdom, on the other hand, job creation programmes intended both to relieve youth unemployment as well as provide relevant training proved ineffective as a post-compulsory educational alternative, in part because the quality of the training programmes was unregulated (Vickers, 1991). By the same token, in the United States it is probably futile to expect school-based vocational education programmes to create enterprises in depressed communities, though some are expected to do so. It may be equally futile to expect job creation programmes to serve educational purposes or to expect private businesses to hire and train (at their own expense) students who have not succeeded at school. It is well to keep these philosophical and cultural differences in mind when appraising the successes and failures of various approaches to integrating education and work experience.

Nevertheless, school-based, employer-based, and mixed modes for providing vocational education and training share some common difficulties:

- establishing effective linkages between school and work settings and/or between theoretical and practical learning;
- designing programmes in which the formal and experiential learning components support and enhance each other;
- obtaining or assigning teachers, tutors, and trainers who are expert in the domain and its salient applications as well as in their teaching and mentoring capacities;
- providing a supportive context for such teachers, tutors, and mentors; and
- ensuring that training opportunities are made accessible to individuals in greatest need by removing scheduling and transportation obstacles.

The relative importance of these difficulties depends on which of the three training modes is dominant – whether the programme is essentially school-based, employer-

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based, or some blend. Some of the more critical difficulties related to each type of approach are further detailed below.

Linkages between the theoretical and the practical in school-based vocational programmes

Such programmes need to link to other sectors in at least three ways: internally, to the school's (or other education providers') academic instruction; externally, to employer and employee organizations (private and public businesses and unions); and externally, to the communities from which the students come, particularly if their work experience is to be based in these communities.

Creating links with other academic programmes gains special significance when vocational education (as in the United States) is seen as a second-class, dead-end track leading neither to further educational achievement nor to a good job. The current ideal in the United States is to have academic and vocational education teachers work together. The objective – particularly in areas related to science and mathematics – is to design curricula that will embed academic skills in technical applications and knowledge and motivate improved academic achievement through this process (Kolde, 1991). The Southern Regional Education Board currently is conducting a concerted effort to bring about this sort of co-operation and has met with some success in several experimental sites (Bottoms and Presson, 1989). It remains to be seen, however, how widely such experimental efforts can be institutionalized and which students are likely to benefit. Experience with broad-based implementation of the 1990 perkins Amendments (described above) intended to advance the integration of academic and practical learning experiences in formal educational settings should provide additional evidence. Finally, it remains to be seen whether these newly integrated vocational/academic programmes will mainly serve the most advantaged members of the target population.

Another form of linkage among educational institutions is necessary when democratic values associated with individual development demand that opportunities for higher education not be foreclosed to individuals choosing vocational education paths (see Chapter 4). In the United States, admission to some form of post-secondary education is possible for almost anyone who chooses to take advantage of it. There are, however, nearly unbridgeable chasms among different types of post-secondary institutions. Community colleges traditionally have assumed the dual function of preparing young people either for work or for continuing academic education in bachelor-degree granting institutions of higher education. As the market for post-secondary education has changed under the influence of both changing demographics and changing job requirements, community colleges have expanded the job preparation function and added job retraining functions for adult workers. Unfortunately, academic programmes facilitating transfer to four-year colleges and universities have been allowed to erode as the more vocational aspects of the community college's mission have grown. The 1990 Perkins Amendments emphasize articulation between high school vocational education programmes and community college technical training. Whether students going through the 2 + 2 programmes (two years of high school technical training plus two years of community college) will have access

to continuing higher education will depend largely on the academic rigor of these programmes at both the high school and the college level.

Considering the evidence provided earlier, linkage to the private sector appears to be an important component in upgrading the content of vocational education, its reputation, student motivation, and student learning. Such linkages also are necessary if vocational programmes are to deliver on their promise of good jobs with advancement potential. Schools, if they wish to provide their students with meaningful work experience or educate them for jobs with advancement potential, need to stay in touch with the latest technological advances, the fast-changing job markets, and the development of new opportunities. They need to create learning situations that engage students in tasks of interest to them and that mirror, as much as possible, situations they will face at work. Most important, they need to cultivate a network of employers who are interested in their students.

Yet, conditions in the labour market continue to change rapidly, leading to questions about the usefulness of creating or attempting to create tight fits between vocational education programmes and specific labour market needs. Since the lag time between identifying specific skill shortages and the development of a programme to respond to these shortages is considerable, there is always the danger that a vocational education programme (and its equipment) will be outdated before any of its students graduate. A recent example is the plethora of vocational training programmes created a decade ago to teach low-level computer programming just as these jobs were becoming obsolete. Another example at a higher skill level is the demand generated by the 1970s oil crisis for petroleum engineers. This demand rapidly abated in the 1980s. Yet another example comes from the electronics industry. According to the United States Department of Labor, this industry recorded a 3.4 per cent drop in total employment between 1985 and 1986, representing a decline of 75 000 jobs. Component companies saw a drop of 33 000 jobs (0.5 per cent of their workforce), and computer manufacturers lost 418 000 jobs or 7.4 per cent of their workforce during the same period (United States Department of Labor, 1987).

Linkages of schools to employer-based training

Linkage of the schools to the private sector has proved no easy task in countries where educational and employing institutions have different objectives and philosophies (see Chapter 6). In these cases, linkage efforts are scattered, uncoordinated, and only occasionally effective. By and large, their purpose – beyond garnering good will from the community – is to ease the transition from school to work through initial job placement.

In the United States, as in other industrialized nations, a number of employer-based training systems have been set up to provide a "second chance" for school dropouts and others who are having difficulties gaining employment or remaining employed. In contradistinction to the vocational education programmes housed in schools, which are heavily subsidized through the federal Department of Education and its state counterparts, employer-based programmes are supported through the federal Department of Labor. These programmes are based on the assumptions that schools are not philosophically equipped to deal with either the needs of hard-to-place young people or the needs of the

labour market; that school people lack the appropriate experience and know-how; and that labour, business, industry, and community organizations are more appropriate providers of the training people need to get, hold, and advance in a desirable job. Usually, this training includes both general education as well as job-specific training.

Vaughan and Berryman point out, however, that the employer-based training programmes funded under successive legislation over the last twenty years have tended to provide entry level skills that place individuals on the bottom rung of the ladder, in jobs that are the most likely to be abolished through automation or that provide little opportunity for advancement (Vaughan and Berryman, 1989). In general, employers in the United States tend to invest most of their own training funds in already skilled and well educated employees (middle- and upper-level managers, technical and professional employees, and sales staff) to make them even more productive (Carnevale, 1989).

Most United States employers do not seem to see the need for general upgrading of their front line workforce. A recent study found that 95 per cent of United States firms reported no shortage of people with high skills (Commission on the Skills of the American Workforce, 1990). There appeared to be little demand or long-range desire for an educated workforce, although 80 per cent of the employers wanted people with good work attitudes and social skills. Obviously, the parallel-systems approach is no magic solution to the development of human capital; it may be time to return to the hard work of creating locally effective alliances and linkages between schools and businesses, facilitated by appropriate governmental incentives.

Effective integration of formal and experiential learning

Creating linkages between business and education organizations can be effective in motivating students, providing some resources to schools, matching young workers and jobs, and providing work experience to students and teachers. None of these, even the last, necessarily provides a channel for developing educational and training programmes that effectively integrate hands-on learning with more formalized instruction. Ideally, school-work combinations should integrate formal course work with guided experiential learning. In practice, many of these programmes either fail to integrate the school-based and work-based components, or fail to structure the experiential component (Simon *et al.*, 1991). For example, in co-operative education programmes, available to students in most US comprehensive high schools, students are placed in jobs by teachers through connections the schools have with specific firms. The teacher is responsible for what the students learn at the job site, but has little influence over the students' work experience or the qualifications of their work supervisor who evaluates their performance. This makes integration of intended learning at school and at work problematical. Even in the German apprenticeship system, currently much admired in the United States, students complain of the irrelevancy of their school work to what they are being asked to learn and do on the job (Hamilton, 1990).

It is significant that many of the designs of programmes that successfully blend experience and more formal instruction have been developed with support of the United States Department of Defense. The training of young military recruits has posed two difficult challenges not faced to nearly the same degree by private or other public

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employers: the need to accept individuals with low levels of skills (including literacy skills), and the need to prepare some of them and also older personnel, as quickly as possible, to understand how to operate highly complex weapons and communications systems. Motivation and incentives on part of both the employer and the employee obviously are high in this setting and not easily duplicated elsewhere; nevertheless, the Department's investment in the development and provision of effective training clearly has paid off.

In the United States, such careful planning to ensure effective training for high-level skills is uncharacteristic not only of the private sector but of most of the public sector as well. For the private sector, the reason may well be that the business goal of short-term work productivity overwhelms any other goals, including training. As noted earlier, the workplace seldom is reorganized in the interest of pedagogy. Vickers reports analogous findings for the British Youth Training (YT) scheme (Vickers, 1991). YT, intended to upgrade the skills of young people and make them widely employable, ended in low-level training for most of them, largely because it relied on employers to provide the training and set very lenient standards. As a result of this experience, the United Kingdom is currently developing ways of assessing and reporting vocational qualifications that combine practical and theoretical elements. An interesting aspect of this new effort is the stress it places on having industry develop performance standards by which candidates will be judged in the context of the workplace rather than off the job, say, by schooling authorities. This approach raises the issue of the extent to which the private-sector training route in the United Kingdom will continue to be judged as a second-class option for young people. The first-class option, of course, is high school graduation and university admission. In the United Kingdom, as in Australia, the two were traditionally linked. During the 1980s, Australia departed from this tradition by creating alternative curricula for graduation – curricula that were broadly relevant to workforce preparation as well as to post-secondary (albeit non-university) studies. The intent is to serve all the youth population of 16-18-year-olds, not just the one third who historically completed high school. At the same time, Australia's statutory assessment authorities are committed to maintaining the academic rigor as well as the acceptability and status of traditional academic secondary education (Howe and Vickers, 1993, p. 36).

Examples do exist in the United States of careful planning for integrating learning at work and learning at school. Currently, Jobs for the Future (JFF) in Massachusetts is exploring the possibilities of alternative pathways for youths through four-year youth apprenticeships. During that time, they would be employed part-time, go to high school for the first two years, and continue with two years of community college. Their work experience initially would rotate the student-trainees through various departments and positions within an organization; they would start to specialize as they entered community college. After four years, they would emerge with an associate degree, practical skills they acquired during their work, and ready for further study or a full-time professional career. The intent is to provide an accessible educational programme which emphasizes contextualized learning while reducing the costs of continuing formal education. JFF has investigated this approach in some detail in the health field, which suffers chronic personnel shortages, from nurses to radiological and medical technicians to occupational and physical therapists (Vickers, 1990; 1992). There is much interest because of the great

need, but to make such a plan a reality will require close co-operation between the regional hospitals and the schools. Especially critical will be the coordination of the practical experience with the formal course work so that students will find the latter meaningful, can integrate their learning, and will acquire useful general and specific skills and knowledge. No doubt, this will require some restructuring and reorganization in both the health care and the educational institutions.

Another prototype is the Pennsylvania Youth Apprenticeship Program (PYAP), supported by the state departments of education, labor, and commerce, several school districts and institutions of higher learning, and more than a hundred firms. Through a combination of classroom-based and work-based activities, students are expected to complete project-driven curricula in four subjects: English, mathematics, social studies, and metalworking. For example, in English, students first read and interpret technical reports and manuals, then write their own reports on manufacturing and management in the metalworking industry. The students spend 16 hours a week working in local metalworking firms as apprentices, doing real work and receiving wages, being let go if they do not perform. Each PYAP site has a coordinating teacher who works with the employers and the schools to ensure that the students' work and school experiences build on each other (Vickers, 1993).

On the basis of these sorts of experiments and experience drawn from other countries, the new United States administration plans a concerted initiative that integrates school and work experiences. Currently (as of spring 1993), the plan is to give individual states flexibility in how they integrate these experiences. All states, however, would have to meet some core requirements. For example, high schools would need to be restructured to allow the complete integration of school and work and to include effective career counseling. Students would have to be offered structured learning experiences in the workplace in addition to their school-based classes. A national set of voluntary skills standards would be developed to assist in all aspects of the programmes, from curriculum development to assessment and possibly including some new form of certification. Programmes would have to establish strong ties to post-secondary educational institutions so that students could receive professional certification and/or college degrees. The state and local bodies that would design and oversee the programmes would have to include representatives from education, business, government, and labour. The federal government would monitor the state programmes against a set of yet to be determined performance objectives. Some key issues remain to be addressed, however, for example, what incentives to use with businesses to convince them to participate in the programmes, how to ensure that disadvantaged students receive adequate access to the programme, and how to allocate resources between students still in school and young people who have dropped out of the formal education system.

Expert teachers and tutors and a supportive context

Perhaps even more critical than the design of integrated learning experiences are teachers and schools that can offer a meaningful context for learning, especially for young people not academically inclined, and work situations that can provide for more than the acquisition of the minimum skills necessary for a particular job. It may seem that

the answer to the lack of authenticity of the school setting is apprenticeship and on-the-job training, but this is hardly the case without some critical conditions being met, as experience within both the United Kingdom and the United States demonstrates. Some of the key conditions necessary for effective work-based training are:

- Individuals with responsibility for training must be familiar with and able to use effective pedagogic techniques: making system functions and tasks explicit, modeling expert performance, intervening appropriately through coaching and error correction, engaging trainees in group work that requires a range of skills and experiences, and involving trainees in appraisals of their performance.
- Individuals assigned training roles must be carefully selected, taking into account both their work expertise and their pedagogic skills.
- Periodic training needs to be provided for trainers to ensure that they keep up to date on new technological developments and organizational strategies.
- When training responsibilities are assigned to supervisors and experienced workers, such responsibilities should be considered an important part of their work, and adequate time should be built into their schedules for this responsibility.
- Work must be organized to allow adequate time for the training and mentoring functions, even after initial skills have been learned by the new worker.
- Individuals with training responsibilities should be recognized and rewarded for good performance in training as much as they are or would be for outstanding productivity in the rest of their work.
- Ratings of group performance must consider contributions by all members of a team, experienced or not; training functions carried on within the group should be part of the performance appraisal.
- Individuals and groups with training functions must be supported in developing effective learning experiences at the work site rather than expecting training to happen as a byproduct of getting the work done.

Few of these conditions are met by most private or public work places in the United States. As Scribner and Sachs noted in the stockroom training they observed, normal production considerations rather than training needs ruled the work. "Work-as-it-is" played the major role in the training programmes (Scribner and Sachs, 1990). When unusual problems arose in the stockroom, trainers helped solve them, and, although their trainees participated as bystanders, they did not receive any special explanations. Some workers assigned training responsibilities seemed to enjoy such an assignment and give thought to what might be an effective teaching strategy; others did not. In general, training happened as it could be fitted in. This lack of training strategy and emphasis on getting the work done appears to be the rule rather than the exception, at least in the United States. Lajoie and Lesgold found this to be true even of traditional apprenticeship programmes:

> "The traditional master's main agenda is to practice his trade or profession – to produce a product rather than to teach a novice his skills. Much of the instruction then is modulated by the economic or product-oriented goals of the master's shop with educational goals subordinate" (Lajoie and Lesgold, 1989, p. 5).

The consequences were not so adverse in work settings where all the skills to be mastered could be clearly observed and imitated by the apprentice and where the economic context for the work usually was self-evident. Most modern work settings, however, require explicit task modeling and mentoring, and this means time must be invested by the trainer. Unfortunately, this is considered to be wasteful downtime by many enterprises. Yet there is no substitute for training that relies on expertise conveyed to the novice through a coach/trainee, master/apprentice relationship, whether one-on-one or in a group setting. Effective though these methods are for the trainee, there is little room for them in today's business world, where most enterprises are oriented toward short-term profits. In fact, in the United States, one-on-one training usually is deemed an inefficient use of the trainer's time (Broadwell, 1986).

Such attitudes create disincentives for workers who are assigned "by-the-way" training responsibilities. Employers need to believe that the development of human capital is in their interest before they will create work situations that encourage effective programmes of apprenticeship and induction under the mentoring of experts. Labor market conditions, governmental mandates and strictures, and relationships among the various stakeholders involved all combine to create an environment that either fosters or discourages the development of effective education and training in the workplace.

It is possible to analyze how these factors vary in different countries thereby creating varying conditions for effective employer-educator partnerships (see Chapter 7 in this volume). It also is possible to identify favorable conditions obtaining in given countries; it is much more difficult to transfer practices deeply rooted in history and culture from one country to another.

Offering opportunities at accessible times and places

A common impediment in the organization of vocational education and training is the failure to provide work-linked education and training opportunities when and where individuals can take advantage of them. Ten years ago, the California Vocational Education Board came up with a new vision: regional centers that would provide realistic work settings – recreating assembly lines, technically and mechanically accurate production facilities, electronics plant conditions, settings for food and other service occupations, and the like. These centers are in existence now; several of them are showplaces and have excellent staff who know what they are doing. The problem is that – with some exceptions – the students are not there. The whole vision has been jeopardized by the logistics. Because two key problems were never addressed – transporting individual students from different locations to the centers when they need to be there and fitting their practical training at the centers into their regular school schedules – most sites are grossly underused.

However difficult the task may seem, the lives of youths in and out of school and the circumstances of their lives must be taken into account in structuring effective training and work experience opportunities. Students are not likely to learn if they live in inadequate housing in communities that are unsafe or lack essential services. They are

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unlikely to advance if their schools are poor or if there are not prospects for progression into meaningful work or higher education.

The structures of education and training programmes must be made compatible with the social organization of an individual's or group's everyday life. This is equally true of school-based programmes and training opportunities at work. It makes little sense to design programmes that take no account of personal impediments or constraints. Matters of scheduling, use of time and space, availability of transportation, responsibilities outside of school or work, and special individual or group attributes – all must dictate the design of programmes and work opportunities. No matter how good a programme is, unless it is located in a place that is easily accessible and fulfills some specific need of the working community, the programme will fail. No country that wishes to stay competitive in the world market can any longer afford to marginalize a large proportion of its youth.

NOTES

1. For a detailed discussion of recent changes in the US textile industry, see Thomas Bailey (1988), *Education and the Transformation of Markets and Technology in the Textile Industry*, Conservation of Human Resources, Columbia University, New York.
2. See also the research conducted for the Air Force Human Resources Laboratory by Lesgold *et al.*, (1986).

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Chapter 6

THE ROLE OF EMPLOYERS AND UNIONS IN FACILITATING THE TRANSITION TO EMPLOYMENT AND FURTHER LEARNING

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There is no one best way of preparing young people for work and further learning. A comparison of the contrasting systems in two successful industrial nations, Germany and Japan, makes this clear. Employers in both countries play a leading role in the provision of vocational and technical education and training (VOTEC). But German employers rely largely on the dual apprenticeship system, in which work-based training and school-based learning occur simultaneously. Japanese employers, by contrast, recruit school leavers and graduates as full-time employees and train them both on the job and off the job.

This chapter explores another aspect of the book's linkages theme: how educational institutions and employers are connected to each other. It emphasises what roles employers (and unions) in OECD countries are expected to play in facilitating the transition for young people from school to work. Each actor assumes a different set of roles according to the type of VOTEC system in place in the country. The role each can play also depends on interactions with other actors, including the education sector and the State. Given that the society-wide objective is to maximise the chances of VOTEC acting as a "bridge" rather than a "trap" for young people in the transition to employment, the policy issues explored in this book involve two broad questions:

i) What roles can be reasonably expected of employers and unions within the existing VOTEC system and other institutions in any country?
ii) What strengths and pitfalls exist in the expected roles of employers and unions in a country, and what policies can be pursued to avoid identified pitfalls and build on strengths?

The chapter begins by developing a two-part framework of analysis. First, the chapter presents a typology of VOTEC systems, and then in Section 2, it identifies the various mechanisms for co-ordination among relevant actors. Within this framework,

Section 3 discusses employers' roles, and Section 4 trade unions' roles, while delaying an overall assessment of alternatives in co-ordination among actors until Section 5. Section 6 presents conclusions and discusses unresolved issues.

1. A conceptual framework for analysing the transition from school to work

A typology of VOTEC systems

The OECD countries' national systems of education and training may be classified according to a number of criteria. This subsection concentrates on three interrelated criteria: the different transition paths from school to work, varied learning settings in classrooms and workplaces, and the division of labour among different actors in providing VOTEC.

From the viewpoint of individual young people, the transition from school to work may be achieved in two broadly different ways (CEDEFOP, 1984). An individual may choose to receive education in school, then obtain a full-time job with an employer who provides training. This transition path is called "sequential" because the change in status from being a pupil or student to a fully fledged worker is abrupt. Such is the case for most young people in Japan, where school-based education is broad and general rather than vocational, and in a number of European nations including France, Italy, Belgium, the Netherlands and Sweden, where school-based vocational education is more significant. Alternatively, a young person may, after leaving school, assume an apprentice or trainee status as in Germany before entering full-time employment. A combination of school-based and work-based education and training which apprentices receive has given rise to labelling this transition path as "dual".

Fundamentally, how can national VOTEC systems ensure that young people progress from school to work smoothly, without interruption or disadvantage? The school-to-work transition is likely to be a success if young people acquire in the course of their schooling and training *i)* literacy and numeracy, *ii)* general knowledge in basic subjects, *iii)* up-to-date vocational knowledge and skills which are in demand, and *iv)* the capacity and motivation to be an effective worker. Young people must be introduced and socialised into the world of work to become effective, so that they can work with other people, cope with pressure to meet deadlines, and deal with the unexpected. If any one element is missing, young people are likely to suffer from unemployment spells or lack of opportunities for jobs which offer further learning.

At a first glance, it may appear reasonable to assume that schools are best at providing general education of the forms *i)* and *ii)*, and employers are well-disposed to provide vocational training of the forms *iii)* and *iv)*. This simplistic division between education by schools and training by employers presumes that schools are where young people accumulate basic skills, while employers have an incentive to provide training for job-related skills.

However, the diversity in the actual provision of the four types of education and training is enormous. For example, some large employers provide remedial education in

numeracy and literacy, or give classes on general interest subjects unrelated to their workers' immediate job tasks. Some schools and colleges also emphasise inculcating habits and attitudes valued by employers, and simulate work situations at their premises in order to develop students' skills of leadership, decision making and problem solving.

In sequential transition paths, vocational education may be provided by employers or by schools. In Japan, for instance, employers assume a major role in introducing young people to the world of work as well as providing on-the-job and off-the-job instruction in vocational knowledge and skills. However, it may be argued that general schooling in Japan inculcates in young people the virtue of hard work and teamwork, and is therefore a preparation for the world of work (Dore and Sako, 1989). In a country like France, by contrast, the State provides most of the vocational education. Young people acquire vocational knowledge and skills in classrooms before they become fully exposed to real work settings. To smooth the transition, however, vocational schools and colleges, such as Further Education Colleges in the United Kingdom, may emphasise work-based learning on college property, as well as work experience at employers' premises, so that young people can perform effectively when they enter full-time employment. In fact, the apprenticeship aims to achieve precisely the same thing: to smooth the transition, by exposing young people to both classroom-based instruction and workplace-based learning, and familiarising them with supervision patterns and expected work habits.

Thus, the distinction in national VOTEC systems between sequential and dual is useful to delineate changes in the individual's status and in the providers of the training. Young people progress from student to apprentice to employee, with the sequential system skipping the apprentice status. With respect to VOTEC provision, the sequential system consists of a progression from school or college provision to employer provision, and the dual system consists of a period of parallel provision by educational institutions and employers. However, the effectiveness of the two types of VOTEC systems seems to depend on whether a system as a whole ensures that young people acquire all four components of knowledge, skills and capability in due course. Just as employers may rely on both on-the-job training and off-the-job instruction in classrooms, schools and colleges may rely on classroom-based and work-based learning. Consequently, the sequential dual distinction may also refer to learning environments.

Some countries have one clear, dominant mode of transition and provision. In Germany, over 70 per cent of young people pass through the dual apprenticeship, although even there, alternative routes (such as full-time VOTEC at educational institutions) exist for graduates of *Fachoberschulen* and other similarly vocationally-oriented schools at upper-secondary level. Other countries, such as the United Kingdom, have diverse transition paths, with Further Education Colleges offering both part-time and full-time vocational education courses while apprenticeships survive in certain occupations. Employers' and unions' roles are consequently more complex and diverse where young people can choose among multiple pathways.

Moreover, social and historical factors may explain the emergence of one mode of VOTEC provision in a country, and the evolution of employers' and unions' respective roles may affect options for the future. For example, it was the deficiency in training provided by employers in France that created pressures on secondary schools to provide

vocational education in the early 1970s. Conversely, although the Japanese government wished to emulate the German dual system in the immediate post-war period, the school-based provision of vocational education declined in importance as Japanese employers took a lead in providing good quality in-house training (Odaka, 1989). The French State filled in a gap in VOTEC provision left by employers, while the Japanese State gradually withdrew its VOTEC provision as employers took on more responsibility. Thus, history explains how different actors' leadership and financial contributions have given rise to employer-led or school-led national systems of vocational education and training.

To summarise, a framework for studying the transition from school to work for young people classifies national VOTEC systems along the following dimensions: *i)* whether or not young people temporarily become apprentices or trainees when they transfer from student to employed status; *ii)* whether VOTEC is in the main provided by the State or employers or jointly; and *iii)* whether classroom-based and work-based learning environments are provided sequentially or in parallel. Each type of vocational education and training system has its advantages and disadvantages.

Young people's status

The sequential transition path has a potential advantage of giving young people immediate security of employment, but a sudden introduction to the world of work may lead to maladjustment and high drop-out rates among new workers. The dual transition path eases the adjustment from student to worker, but apprentices are potentially vulnerable to being used as a source of cheap labour.

Providers of vocational education and training

Employer-based systems may be considered more flexible in being able to provide training for up-to-date technologies than school-based systems, which may be subject to bureaucratic rigidities in changing the curriculum. However, employer-based systems are potentially more vulnerable to fluctuations in the provision of VOTEC according to business interests, while the level of provision in school-based systems may be planned with long-term public interest in mind.

Learning environments

On one hand, classrooms enable young people to receive formal instruction in broad theoretical knowledge, but may not provide meaningful contexts for some students, thus deflating their motivation to learn (see Chapter 5). Workplaces, on the other hand, may be ideal for effective learning, but have the potential danger of learning being too narrowly job-specific.

2. The nature of interaction among actors

Before discussing what roles employers and unions may play in facilitating the transition from school to employment, it is useful to identify all the relevant actors, and to establish how they may interact with each other.

The actors, or "stakeholders" as they are sometimes called, include the following: *i)* young people themselves whose motivation to learn and acquire skills is framed by a variety of factors including own ambition, parental values, the value attached to education in society, and job opportunities; *ii)* teachers, trainers and institutions in the education system; *iii)* policy makers and public-sector officials at the national and local levels; *iv)* employers and their associations; *v)* workers and their trade unions. In each country, a different balance of power is struck among the stakeholders depending on what resources they can command.

The provision of education and training requires some forms of co-ordination among these actors, because those who contribute to providing and financing it are not necessarily those who benefit from it in the short run. For instance, under conditions of free movement of labour, an employer may invest in training in a worker who may be "poached" by another employer offering a higher pay before the former employer can reap returns from his investment. Because of this risk, employers individually may prefer to buy in skills rather than train in-house, and they may end up providing an insufficient amount of education and training from the viewpoint of the economy as a whole. In short, while it may be in the individual interest of employers not to contribute to the provision of training, it would not be in their collective interest. Different countries have different organisational frameworks for reconciling the two.

A spectrum of mechanisms exists to co-ordinate actors. The two extremes of the spectrum may be characterised as a contrast between planned and unplanned systems, between reliance on bureaucratic rules and on market forces. At one extreme, in a state-led system, the public sector may allocate resources for education and training as it sees fit with minimum consultation with other actors. Most nations ensure that a sufficient amount of general education is available through direct provision. An intermediate mode of co-ordination is corporatism, at the national, regional and sectoral levels. The provision of training is largely the responsibility of business or employer organisations, with varying degrees of state and trade union involvement in setting standards and monitoring the quality of training. Employers' associations and trade unions participate in the process of policy making with the State to create a consensus on education and training issues. Such tripartite regulation exists at the national level in Germany (where the Federal Institute of Vocational Education works out the training content of each occupation in consultation with employers and workers' representatives) and in Japan (where the Ministries of Education and Labour have their respective deliberation committees on policy). Towards the other extreme, the public sector takes a back-seat role, while employers and workers negotiate bilaterally at decentralised levels. The regulation over apprenticeships in the United Kingdom has been of this voluntarist sort, which is in contrast to the statutory framework in Germany.

In recent years, an even more deregulated system has emerged, most notably in the UK and the US. It relies on "market forces" to balance demand and supply in the education and training markets. For example, increasing parental choice in schools is considered to improve schools' operational efficiency. At the same time, employers are expected to respond flexibly and tailor training packages to suit the preference of individual young people wielding government-provided training vouchers.

The term "partnership" has recently been used to describe co-ordination of the provision of education and training. Partnerships suggest a stable bilateral commitment to achieve a common objective for mutual benefit. However, in the field of education and training, as in other fields, they refer to different things according to whether the predominant national mode of co-ordination is state-led, corporatist, or deregulated. Thus, partnerships may be between the public and private sectors, or between "social partners" (including employers' associations and trade unions) in corporatist arrangements where representative bodies are accorded explicit functions in resolving individual and collective interests. A more recent variant of partnerships focus on those between business and education. They are particularly prevalent in the US and the UK, where decentralised co-ordination between individual employers and individual schools is being encouraged for the sake of meeting local needs flexibly.

Partnerships may underpin a strong community of interest in which every member is committed to make it prosper. In deregulated settings, partnerships have a clear market-enhancing function to improve the flow of information about respective partners' given preferences. The interaction between partners may also be a learning process, in which mutual expectations about respective roles may converge over time. However, if no consensus emerges over the principle governing each partner's roles, or if the fruit of a linkage is perceived to be distributed unfairly, then partnerships may merely heighten the co-ordination problem, increasing transaction costs in administering them. Transaction costs are obviously lower the more goals and values are shared between partners, because less time is spent disagreeing and bargaining.

While there may be various factors which affect the success or failure of specific bilateral partnership and multilateral corporatist arrangements in the provision of education and training, at least two criteria exist which may determine their long-term viability. One is the cost-benefit criterion, which asks whether each partner has derived enough returns from the cost of investing in a partnership. The other is the effectiveness criterion, applied to a partnership as a whole, which asks how effective it has been in achieving the objective of providing sufficient education and training as a smooth link to employment for all.

3. Employers' roles

Employers' roles clearly vary according to whether the national system of VOTEC is sequential or dual, whether it is state-led, corporatist or deregulated, and according to the characteristics of employers. In any case, there has been a tendency in many OECD countries to favour enhancing the role of employers in leading the provision and financ-

ing of VOTEC education and training. The question of why this might be the case will be tackled first, before enquiring into employers' interests and responsibilities. The roles employers and their associations may play are then examined in turn.

Why is the employers' role considered to be of increasing importance?

Employer-based systems of vocational training have come to be seen in a favourable light in the last decade for a number of reasons. First, the erosion of international competitiveness in certain countries led to a call for reforming the VOTEC system so as to meet the needs of the economy better. Because major challenges in international competition have come mainly from Japan and Germany, their enterprise-driven training systems have been taken up as models worth studying if not emulating.

Second, the nature of global competition and technology may have changed in ways that favour employers as providers of VOTEC education and training. International competition is no longer based on low prices achieved through mass production, but on quality, customised design, and shorter product cycles made possible by more flexible production technologies. Moreover, an accelerating rate of obsolescence of today's technical skills is forcing employers to engage in continuous training and retraining of their workers. Thus, one-time-only training for an occupational skill as typified by apprenticeships is giving way to recurring training for polyvalent skills. It is assumed that employers are the best judge of what skills are required for the future, and that they are best at keeping the content of their training up-to-date.

Third, high youth unemployment in the early 1980s led public policy makers in many OECD countries to look to employers' active involvement in labour market measures. The rationale behind this move was that, ultimately, only employers could provide real jobs, and that employers' involvement enhanced the chances of young people being trained in useful skills when demand picked up.

Lastly, an ideological shift towards neoliberalism in the 1980s in the UK and the US has also contributed to a focus on employers' role. Pressure to reduce budget deficits led policy makers in these countries to pass responsibility for financing and providing VOTEC onto private sector employers. At the same time, governments' greater reliance on market forces to revitalise national economies has taken the form of privatization and deregulation. Deregulation in turn is associated with the creation of an enterprise culture in which dynamic businesses become the engine of industrial adjustment and growth. Vocational education and training is then not just about turning young people into effective employees but also about transforming some into entrepreneurs.

What are employers' interests and responsibilities?

Employers are of various types. They may be individual owners/managers of a business. But more likely, they are organisations. Some are large global corporations like Motorola, and others are small- or medium-sized companies. Enterprises may be privately owned, publicly quoted in stock exchange, or in the public sector. These differences in size and ownership undoubtedly affect employers' orientation towards education and

training. However, all employers have a common interest in attracting people of the right calibre to fill job vacancies. What this right calibre is depends on the sector of the economy, employers' choice between "Fordist" and more flexible modes of work organisation, and their accompanying policies over human resource development.

Certain sectors have always experienced difficulty in attracting workers of the right calibre in employers' opinion. The construction industry is a case in point in many OECD economies, as was the manufacturing sector in the United Kingdom, where the most able workers traditionally were channelled into financial and public services. Here, the employers' interest lies in improving the general image of the sector so that young people will think of a career in that sector with endorsement from parents and encouragement from career guidance teachers.

Sectoral variations may also occur due to differential growth. Thus, in mature or declining industries such as shipbuilding, employers' utmost concern is to restructure the business which may involve retraining of existing workers. By contrast, in rapidly growing industries, employers are likely to be more preoccupied with recruitment of new workers to alleviate labour shortages. In general, when an economy is growing rapidly, employers' main interest in strengthening the recruitment link with educational establishments is likely to coincide with young people's interest in securing a smooth transition to employment. Conversely, in slow-growing economies, and in recession rather than in boom, employers' short-run desire to maintain operational efficiency is likely to deviate from the interest of young people, some of whom may experience prolonged spells of unemployment.

The extent to which there is a cyclical divergence between employers' economic interest and the interest of young people (or even public interest) depends on the nature of decision making within enterprises. First, decisions over recruitment and training may be devolved to the level of line management as had been typical in the United Kingdom. In this case, training costs are likely to be treated as an overhead to be cut whenever profitability declines (Lane, 1989). The same shortsighted approach may lead employers to offer jobs involving little training in order to maximise output contributions from workers whenever demand is tight. By contrast, education and training may be properly treated as investment for the long run if top management retains the function of making strategic decisions over human resource development. Best results have occurred when top management has linked human resource management clearly to business strategy (Rosow and Zager, 1988). Instead of treating training as a compartmentalised activity within the personnel department, strategic managers can secure a well-trained workforce capable of meeting the future as well as the current needs of their business operations.

Second, it is important to realise that several stakeholders are involved in the operation of any enterprise, whether privately or publicly owned. The relative position of shareholders, employees, banks, customers and suppliers affects the definition of interests and responsibilities within an enterprise. For example, in both Japan and Germany, banks often develop close relationships with their client enterprises, and they influence companies' investments in both physical and human capital. This situation is often contrasted with the shorter time horizons found in Anglo-American corporations run predominantly in the interest of shareholders. Workers may more likely be treated as a valued resource

in the former type of enterprises, and as an expendable factor of production in the latter type.

Indeed, the lifetime employment system in large Japanese enterprises enable employees to be a major stakeholder, forcing managers to think long-term in devising human resource plans. Consequently, Japanese firms do not respond to recession by cutting training budgets, but by applying surplus man hours to improving skill levels (Dore and Sako, 1989). The works council in German corporations satisfies a similar function, not only by providing a forum where employees can voice their views on various matters including training, but also by making it harder in practice for companies to fire workers in recession. (The economic downturn both nations have faced in the mid-1990s may be a test for such practices, however.)

There is also evidence that labour-management relations have had a major impact on work organisation, the training requirements of jobs, and learning opportunities associated with those jobs (Maurice *et al.*, 1986). At one extreme, some managers have placed little trust in workers. If workers are given little discretion in prescribed tasks, their opportunity to exercise problem-solving and initiative-taking skills is minimal, and the low skill requirements lead to low wages. At the other extreme, high trust between managers and workers has given workers greater discretion and responsibility. Training to support the exercise of discretion must include problem solving and teamwork, as well as an emphasis on breadth of technical skills.

The high trust work organisation has become increasingly attractive to firms because of the accelerating pace of technological development and global competition. It also affects wealth creation and distribution in society: the higher worker skills found in flexible work organisations are associated with higher level wages than in the low-skill, low-discretion jobs found in "Fordist" workplaces. Although the imperatives of global competition may be forcing more employers to move towards flexible work organisations, inertia may be well-grounded in some cases. "High skills or low wages" is very much a matter of society-wide choice (National Center on Education and the Economy, 1990), but individual employers may be unable to carry through the transition without co-operation and co-ordination with other employers and trade unions.

Moreover, while training for a broad-based foundation of technical knowledge is required as a basis for further learning and retraining for future skills, such training applies more to core, regular workers than to peripheral workers with less security of employment. Employers' strategy to distinguish clearly between core and periphery workers, and to rely more on subcontracting services from smaller firms and the self-employed, may point to a tendency for employers to concentrate their training resources on the lean core. Access to employer-provided training opportunities may also be inegalitarian because better-educated workers tend to receive more training. This is because employers can rely on cost-effective methods of training for well-educated workers who are faster and more self-reliant learners.

To summarise, the more enlightened and long term employers' perspectives are, the more likely they are to provide initial training in broad-based foundation knowledge themselves. But even if enlightened employers exist, good training provisions may be skewed towards a segment of the workforce who are well educated and/or in the core.

Moreover, the relationship between VOTEC and economic performance inherently creates a virtuous or vicious circle. Poorly performing employers are not likely to be able to provide good training. While good quality VOTEC enhances employers' overall performance, it is also the case that the best performing employers are the ones who can undertake a major role in the provision of VOTEC. That relationship suggests the following proposition: the more efficient an employer is, the more successful employer-led VOTEC is likely to be.

What roles do employers play?

Given these pressures and expectations, employers may be induced to play a variety of roles in helping young people make the transition to employment and further learning. Each role contains a different mix of motives, some directly related to firms' self-interest, and others coloured by a sense of social responsibility to contribute towards public interest in the long run. Employers' functions are discussed below, in three broad categories: *i)* Interface with the education sector; *ii)* The provision and funding of VOTEC; and *iii)* Creating incentives and environment for young people to learn.

Interface with the education sector

One way in which employers can facilitate transition to work is to co-ordinate recruitment and curriculum development with the education sector. Whether the transition from school to work is sequential or dual, various surveys indicate that employers rarely expect schools and colleges to provide them with recruits who have only specific vocational skills (see for example, Confederation and British Industry, 1988). More commonly, employers value school leavers and graduates who have a combination of the following: *i)* basic skills of literacy, numeracy, communication and problem solving; *ii)* positive work-related attitudes (*e.g.*, dependability, co-operativeness, pride in work, desire to learn and advance, etc.); *iii)* an understanding of the work or business environment; and *iv)* vocational knowledge and skills.

The education sector may not meet employers' requirements for a number of reasons. First, education systems may suffer from an academic bias to a varying degree, with curricula framed by those who believe in the virtue of learning for its own sake. Second, where vocational education is provided at schools and colleges, the curricula may be out-of-date, thus not meeting the requirements of jobs that employers are offering. Third, because employers possess imperfect information about school leavers' attributes, they typically rely on academic achievement as a proxy measure for valued qualities (such as capacity for effort) as well as for general skill attainment. Commonly, school-leaving certificates constitute a minimum portable credential of employability and trainability. As such, employers expect all school leavers to come out with some qualifications. The fact that, for example, 25 per cent of French youth leave school without any qualifications therefore poses a grave problem, as they are likely to face difficulty in obtaining jobs. Germany and Japan stand out for their having relatively few dropouts or leavers without school qualifications.[1] Given these problems which are more serious in some countries than others, in what ways can employers solve or alleviate them?

Strengthening recruitment links with schools and colleges

One way to satisfy employers' needs is to strengthen recruitment links with educational institutions. Various methods have been used by employers to do this, including offering work experience placements during vacations, giving financial sponsorships to individual students, and developing personal networks with school and college teachers.

Employers generally have an incentive to ensure that leavers and graduates with good qualifications apply for jobs at their establishments. Employers put more resources into recruitment when labour markets are tight than when they are slack, and for occupations in which skill shortage is known to exist. Corporate sponsorship, offered by large corporations (such as BP, Shell and IBM in the United Kingdom) to science and engineering undergraduates, is a recruitment device in such circumstances.

In Japan, where corporate sponsorship is relatively absent, recruitment at all levels relies more heavily on personal networks between employers' personnel departments and teachers, tempered by objective ranking of students' academic achievements. Not surprisingly, selection and recruitment are taken with the utmost seriousness in a sequential, employer-based system where the lifetime employment norm renders the initial job placement a once-for-all determinant of young people's life chances. Employers' interest lies in maximising the chances of making an accurate judgement about each recruit's personal attitudes and general learning ability. They rely on recommendations from school and college teachers whom employers come to know personally over time, and they use academic results and written selection tests. Teachers take on the role of job placement officers in local labour markets.

In a different setting, when youth unemployment in many OECD countries became a source of serious social concern in the early 1980s, employers became involved in labour market measures for employment creation and training. One such programme in the United Kingdom was the Youth Training Scheme (YTS) which was intended to provide a combination of training and work experience to all unemployed school leavers. Although employers took on YTS trainees for a variety of motives including a sense of social responsibility to the local community, many firms used the scheme to screen for good workers among the large population of unemployed youth (Dore and Sako, 1986).

More recently, "compacts" were introduced in the US and the UK as a formalised way of establishing recruitment links between schools and local businesses. The Confederation of British Industry has appealed to the self-interest of UK business to strengthen recruitment links because demographic changes will yield smaller numbers of new recruits in the future (CBI, 1988). What is rather different from the informal personal networks in Japan is that compacts work only in certain regions and are aimed mainly at potential dropouts. Formal contracts which make job offers conditional on school leavers attaining a measurable target in terms of attendance, punctuality, numeracy, literacy and social skills also have the other, perhaps more important function of motivating young people to learn.

Employers' involvement in designing curricula at schools and colleges

Another way in which employers may enhance young people's chances of successfully obtaining jobs is for them to become involved in designing curricula at schools and colleges. The level at which employers become involved is, however, different from country to country.

Individual employers in the UK's decentralised system have become involved in school curriculum development as part of the education industry partnership drive.[2] At the level of higher education, some British employers have also played a role in making course curricula more vocational and practical. For example, degree programmes may be created especially for specific companies' engineers, as in the case of a degree in electronics and computer control systems for Ford's European engineers (*Financial Times*, May 15, 1990). Such tailor-made programmes to meet the needs of industry are one aspect of close university-industry links advocated by some governments.

By contrast, university-industry relationships have remained distant in Japan, where university engineering education is more theoretical than practical, and more basic than applied, as compared to the curricula in the UK or the US (Dore and Sako, 1989). Such arm's-length relationships in curriculum design are also maintained between industry and vocational high schools, whose teachers are less worried by the lack of the most recent generation of robots and CNC machines. They believe that schools are where basics are taught without early narrow specialisation which may foreclose some career options in the future, and where some pure curiosity-driven learning ought to be encouraged without the constraints of whether it is useful for work or not. Such thinking is reinforced by the centralised process of curriculum development.

The provision and funding of vocational education and training

Traditionally, most employers provide on-the-job training (OJT) as part of initial training. It has the advantage of motivating young workers to learn by putting them into a real work context. Employers themselves derive an added advantage in being able to screen for good employees, while obtaining some contribution to output from trainees.

Given the perceived need for broad-based theoretical knowledge, however, initial training may become increasingly off the job. In Germany, for example, the dual system allows apprentices to spend the initial year full-time in vocational schools to receive broad-based instruction in one of 13 occupational fields before choosing a narrower occupation for in-service training from the second year. Such a tendency towards full-time classroom-based instruction, whether offered by employers or by public-sector vocational schools, contains the potential danger of discouraging young people who learn better in work settings.

Employers, particularly large ones, have provided off-the-job instruction in their own facilities for a number of reasons. First, remedial courses in reading, writing and arithmetic may be deemed necessary for some young recruits. Second, some compensatory education in technical knowledge has become increasingly necessary for adult workers due to a more rapid pace of technical change. Third, in-house training facilities may be used to provide induction courses to inculcate the corporate culture in employees,

and to give company-specific training on new products or customer services. Fourth, a company's reputation may be enhanced by offering more general courses for personal development and advancement as part of employee benefits. Such a reputation helps to attract good quality new recruits and to motivate existing employees. These considerations lie behind some major companies offering degree programmes at campuses owned and run by themselves for their own employees (Eurich, 1985).

Employers may also provide vocational training not only for their own employees but for other workers at training centres run by employers on a commercial basis. (Such for-profit training markets exist in particular for information technology-related skills.) The training industry has also produced a variety of new teaching aids, including video tapes and interactive computer packages which may be used by employees to learn at their own pace.

While some employers see the training industry as a revenue-generating activity, others regard the creation of VOTEC institutions as service to the local community. A British policy initiative in this latter vein was the creation of City Technology Colleges (CTCs), which provide inner-city children with a broad technological education in a well-equipped environment. The original aim in 1986 was to have industrial sponsors pay all or a substantial part of CTC's capital cost. Despite the target for corporate contribution being adjusted downward, donors were not forthcoming, and the central government has had to bear most of the cost. Only a small number of CTCs have come into operation. Employers' unwillingness to fund such an initiative appears to be due to small returns (or even negative impacts) on their reputation in the local community. Companies may regard a large donation to a single expensive, high tech institution benefiting only a few students to be an ineffective form of contributing towards the local community. Moreover, some companies may have been deterred by the hostility with which CTCs were viewed by local government, whose monopoly over education was being challenged. Thus, employers' acts of social responsibility are more forthcoming if they also satisfy their business interests and/or enhance their reputation in the local community.

Creating an enterprise as a place for continuous learning

After recruitment and initial training, employers have an interest in encouraging further learning both on the job and off the job if only to make continuous improvements in productivity. Employers can motivate young workers to engage in further learning in a number of ways. First, they may provide self-study opportunities, for example through evening classes or correspondence (or open learning) courses. Employers may offer to bear the cost of course fees, while individuals spend their own time studying.

Second, employers can lay down a clear career progression route for young workers, with promotion linked to training and qualifications. For example, ex-apprentices in Germany have an incentive to learn due to the possibility of training further for a *Meister* qualification with the associated higher social status and pay. By contrast in the UK, once fully qualified, craftsmen tend to remain as craftsmen throughout their working life.

Third, young workers' motivation to learn can be kept alive in flexible work organisations if supervisors and older workers can give them advice and help whenever necessary. This is particularly important immediately after each formal training course.

Such support exists in Japanese and German workplaces where supervisors are trained in pedagogical skills as well as in technical skills. Supervisors and foremen may be inclined to act as mentors or paternal figures with a holistic concern for the well-being of their subordinate trainees. Young people may be well-motivated to learn under such supportive supervision. Supervisors may also have an incentive to be committed to teaching their subordinates. In Japan, the capacity of experienced workers to be good teachers is appraised regularly, and may contribute to promotions. In Germany, whether apprentices pass the externally assessed final examinations reflects on individual *Meisters'* personal responsibility and pride.

Motivating young people to learn by introducing the world of work

Some employers, typically only large enterprises with a high profile in their local community, can also enhance young people's motivation to learn, before recruitment. Benefits of such employers' actions are necessarily diffuse and not easily appropriable by individual employers.

As an example, IBM in the United Kingdom has had two education liaison managers, one responsible for liaising with universities mainly over recruitment and the other responsible for building a good image of industry at schools. Specific initiatives, some dating from the mid-1960s, include IBM giving prizes for competition in school projects, computer programming and simulation, and the donation of surplus computer equipment to schools. (It should be noted, however, that IBM, undergoing major restructuring in the mid-1990s, may alter its involvement in education projects significantly in the years ahead.) Individual employers' initiatives in the United Kingdom have coexisted with voluntary sector activities, such as Young Enterprise, which enables students to form and operate a company, and Project Trident, which offers work experience and voluntary work for students. More recent policy initiatives include Industry Matters, which arose out of the 1986 Industy Year and offers courses delivered by business managers at schools, and Understanding British Industry, which gives teachers opportunities for placements in industry.

It is not clear to what extent such image-building activities work towards attracting able school leavers and graduates to industry. In Japan and Germany, where major industrial corporations do not suffer from an inferior image, their ultimate advertisement to attract able young people lies in the companies' high prestige and their reputation for offering good training programmes. Work experience in well-run organisations may motivate students, and may cure their myopia in wanting to take up "dead-end" jobs offering immediate income, but less security and income growth. The impact on young people is more uncertain if work experience providers undervalue training and give students simple, repetitive tasks only.

What is the role of employers' associations?

So far, we have dealt with the role of individual employers without considering how they may relate to each other. Employers' associations, organised either on a geographical basis or on a sectoral basis, may be given a role in ensuring an effective VOTEC

provision, more so in corporatist systems than in state-led or deregulated systems of co-ordination.

Individual employers may be unwilling to provide training if they expect trainees to leave their organisations before they can recoup the cost of training. One solution to this market failure would be to make non-training employers (free riders) pay for the benefit of "poaching" those already trained by a payroll tax at the national level (as in France) or at the sectoral level (for example, the levy-grant system administered by Industrial Training Boards in the United Kingdom until recently). An alternative solution would be to rely on employers' associations to impose sanctions on potential free riders who are dependent on valued resources (information services, public subsidies, training facilities, etc.) which associations control. Then employers may either decide not to poach at all, or undertake enough training themselves so that the loss from being poached and the gain from poaching are seen to cancel out. German Chambers of Commerce and Industry and Craft Chambers are said to operate in this way.

Besides rectifying market failure, associations may also enable employers to exploit economies of scale in VOTEC provision. Smaller employers in particular benefit from such pooling of resources, in the form of inter-plant training centres in Germany, and in joint training by co-operative associations in Japan.

Another important role played by some associations is the setting and monitoring of training standards. In Germany, the Chambers have a statutory function (as laid down in the 1969 Vocational Training Act) of supervising training given in enterprises and of setting standards for examinations to be taken at the end of the dual apprenticeship. This system ensures that the occupational qualifications will have common currency throughout the country.

In general, co-ordination between employers becomes more important if workers are highly mobile between firms. Conversely, if firms have highly developed internal labour markets, employers can more easily recoup the cost of training their own employees, and rely on company-specific standards of competence for ranking and promoting them.

Lastly, employers' associations have a role in representing their members' views on policy. They may act more like a pressure group lobbying the government as is typical in the US, or else they may not only be consulted but actively participate in policy making as has been traditional in Sweden.

4. Trade unions' roles

Just as employers' associations are representative bodies of employers, trade unions in OECD countries are representative bodies of workers. This section discusses first the interests and responsibilities of various types of unions, before analysing what roles they may be expected to play with respect to education and training.

What are trade unions' interests and responsibilities?

Among various economic and political goals which trade unions may have, one common core aim is the protection of workers' interests. Workers' general interests lie in obtaining job security and high wages. This aim may be advanced using a variety of means, which depend in part on the method trade unions use to interact with management, and in part on the structure of trade unions.

The most arm's length mode of interaction with management is collective bargaining over terms and conditions of work. Collective bargaining helps articulate the wage structure and the link between pay levels and skill status. Trade unions thus affect the incentive structure for employers to provide training and for individual workers to acquire skills, but have little say in the timing and content of training provided by employers. In fact, trade unions tend to be cast in a reactive mode, and consequently can hope only to minimise damage when they are told at the last moment about major corporate restructuring involving plant closures or mass layoffs. The early 1980s recession convinced American unions to look beyond a narrow collective bargaining approach and to consider the benefit of a greater degree of worker participation in corporate decision making.

Worker participation involves worker representatives at the workplace engaging in joint decision making with management over a broad range of issues. Worker representatives may or may not be union members. Workers not only have a say in the determination of terms and conditions of employment, but they are also consulted on decisions about investment in new technology, plant relocation and product diversification. Thus, the timing and content of employer-provided training and retraining would be discussed in this larger context of business policy. The rationale behind such worker participation is that ultimately, all business decisions affect workers' pay and job security. Moreover, workers are more likely to be productive if they are given a voice within the firm. In some other countries, such as Germany, worker participation or co-determination is a legal requirement for enterprises over a certain size.

Even with worker participation at the enterprise level, the defence of real living standards for workers may not be easily achieved. Trade unions may regard working closely with the State a more effective means of protecting workers' interests than dealing with individual employers or employers' associations. Trade unions in some countries consequently have a national association which is given a legitimate role in national policy making, as in Sweden and Germany. An alternative route for trade unions to voice their views is to forge a close link with political parties, as in Australia. In fact, trade unions may themselves become an instrument of political movements. But some countries have unions which are split according to political ideology, as in France. Other countries like Japan have unions which are affiliated to political parties with little chance of forming a government. These are pitfalls which undermine the effectiveness of trade unions at the national level.

Trade unions also face potential problems in not being able to speak with one voice, depending on how they are organised. As mentioned before, workers' general interests are enhanced if they are given access to education and training for up-to-date skills which

raise labour productivity and hence wages, and which minimise the chances of job loss. However, a worker's loss (in job or pay) may be another worker's gain, and here lies the problem for trade unions in guarding the interests of all workers, be they young or old, unskilled or skilled, regular or temporary. Different unions have different rules and solutions to deal with such potential conflict of interest among workers.

Unions may be organised along craft, enterprise or industrial lines. Craft unions are the least encompassing in their membership which consists of workers who have attained a skills status though the successful completion of apprenticeships. They have an interest in guarding their members' pay by controlling the entry into apprenticeships, and members' job security by clearly demarcating jobs which can be carried out only by skilled workers. Craft unions have been responsible for defining an occupational identity in the workplace, which is important in helping young people articulate their career choice. However, with technological change, craft unions may become associated with restrictive practices as they have a vested interest in protecting the job security of older members who may not be easily retrained to update their skills. In recession, craft unions also tend to insist on the "last-in, first-out" rule for layoffs, which favours the interest of older over younger workers. This contrasts with the tacit understanding by Japanese enterprise unions that older workers should give way to young recruits so as to maintain the age structure of the enterprise workforce and the long-term competitiveness of the enterprise.

Some unions are highly encompassing at the sectoral level, as in Germany where large industrial unions predominate. Industrial unions accept all workers employed in a particular sector into their membership, while benefits of their collective bargaining activities are extended to non-members as well. Because differences between employers cannot be fully taken into account in industry-wide agreements, industrial unions take on the responsibility to ensure that minimum standards are observed by all employers in a sector. The task of working out the details of industry-wide agreements within enterprises is then left to the works council, although it may be run predominantly by union members.

What roles do unions play?

Trade unions are of various types, with different structures and goals. Unions' roles in education and training depend also on how they interact with management and the State. Furthermore, unions' role in education and training can only be discussed in the context of their role in framing the work organisation and wage structure, which in turn affects individual incentives and opportunities to learn.

Creating incentives and environments for learning

For initial training, the major role which trade unions can play is in legitimising the training process in the eyes of all workers while at the same time enhancing employers' incentive to provide training. They can do this by monitoring the quality of training, and maintaining a low relative pay for young workers if employers are providing general training. In the United Kingdom, for instance, unions fear that employers may use young workers as cheap labour and shortchange them in providing proper training. To stop the

displacement of their members by young workers, unions have negotiated increases in apprentice pay relative to adult pay. No clear status differences have existed between young trainees (or apprentices) and young workers. Employers have consequently faced a rising cost in training which has contributed to a significant decline in the number of apprenticeship places offered in manufacturing (Marsden and Ryan, 1990).

Such a vicious circle was avoided in Germany, where the quality of training has been monitored and maintained effectively not only by a works council within each enterprise but also by employers' associations. Moreover, there has been a statutory framework, unlike in the United Kingdom, which clearly defines the rights and obligations of entering into a training contract under the dual system. Trade unions have in effect endorsed the legitimacy of the status of trainees who are asked to make a contribution to the training investment, as distinct from that of young employees. Trainees' receipt of a low allowance is acceptable as long as training offered by employers is deemed to satisfy a prescribed standard.

Introducing young people to the world of work

Trade unions, or individual union members, may also play a direct role in introducing young people to the world of work. For example, union leaders or certified instructors for apprenticeships may give talks at schools, to show what apprenticeship involves. Such direct contact may provide a role model for young people, and widen the range of occupational careers they may consider undertaking.

In some countries, students and teachers may also be organised into trade unions. While their primary role may be the representation of their respective interests, these unions may also contribute towards smoothing the transition from school to work. For instance, teachers' unions may provide a forum for sharing information on developments in the labour market and on career guidance skills.

Changing work organisation

We have already discussed, under employers' roles, the advantage of flexible work organisation in meeting the needs of the present competitive environment. Flexibility implies not only that workers can carry out a variety of tasks, but also that they have the depth of technical knowledge to be able to identify the source of problems and to solve them without assistance. The former requires that semi-skilled workers carry out some tasks which had hitherto been reserved for skilled workers, and the latter that blue collar workers carry out some tasks which had hitherto been done by the engineering staff. Training in broad-based skills is a prerequisite for implementing such flexible work organisation. But particularly where jobs had been finely demarcated, as in British and American auto assembly plants, reducing job classifications must accompany such training. Trade unions have a role in bargaining over a change in job classifications in such a way as to elicit employer commitment for job security. Difficulties in introducing more flexible working practices, which may arise in enterprises with multiple unions (or bargaining units), have partially been solved by establishing a single bargaining table at which all unions negotiate simultaneously.

Stabilising employers' provision of training

Trade unions also have a vital role to play in exercising checks and balances on employers' strategy when employers' interests diverge from those of workers. In particular, cyclical downturns and the introduction of new technology put trade unions' bargaining power to test. Their role is to insist on minimising redundancies and on training or retraining of workers not required for immediate productive activities. Put another way, trade unions may insist on employers' commitment to employment security, thus placing a high penalty on employment-based VOTEC programmes of poor quality.

As an example, trade unions, with backing by the government, the Chambers, and public opinion, succeeded in making German automobile manufacturers increase the number of apprentices in the 1970s period of crisis and restructuring (Streeck, 1989). Left to the profit motive, businesses would have cut back on the provision of apprenticeship places, which would have been to their own detriment in the medium to long term.

Joint union-management training provision

Another successful way in which trade unions have ensured employers' contribution to training during recession is the setting up of training funds jointly administered by the United Auto Workers (UAW) and major car manufacturers in the US (NCEE, 1990 pp. 110-112). In anticipation of major layoffs in the automobile industry in the early 1980s, the UAW negotiated with individual companies to set up a fund to which employers contribute 5 cents per hour worked by an active employee so as to finance training for workers who are made redundant. These funds were directed at training workers at the car company's own training centres. More recently, the contribution was raised to 25 cents per hour, to cover not just redundant workers but those who want to be upgraded. In a similar vein, the Communications Workers of America (CWA) and the United Steel Workers of America have also been setting up training institutes jointly run with companies. It is estimated that in 1989, five major joint union-management programmes offered training to a total of 709 000 workers, and had annual budgets totalling about $324 million (Office of Technology Assessment, 1990, p. 242).

As part of coping with corporate restructuring, and in order to enrich working life, unions have been instrumental in negotiating education leave for all workers. Some workers may draw on the above-mentioned joint training funds to receive job-related education; remedial mathematics and computer awareness may be necessary before receiving training on statistical process control. Others may enrol in full-time college programmes, while their pay is guaranteed by the company. These programmes are aimed at broadening the educational content of training, and help make workers more forward-looking and pro-active towards their own careers. Thus, although the joint union-management training provision was born in times of mass layoffs with an emphasis on retraining and career counselling (including pre-retirement planning), it may be recast and extended to remedial and further education for young people.

Direct provision of training by unions

Lastly, unions may provide training and retraining for their own members. A British electricians' union, EETPU, in response to members being made redundant in the late 1970s and early 1980s, built a union-funded national network of training centres to provide short training courses in electronics and computing skills. The network of training centres is also used for training members in negotiation techniques, labour law, pensions, and health and safety matters. Trade unions and federations of trade unions in other countries (for example, the DGB in Germany) also provide training, but rarely initial training for young people.

5. Partnerships

Different societies rely on different types of partnerships to facilitate young people's transition to employment. This section first discusses the business and education partnerships which have become popular in the less regulated economies of the UK and the US. Their absence is conspicuous in more regulated economies such as Germany and Japan. Some of the common assumptions behind the major schemes in the US and the UK are discussed. The section ends with a brief discussion on social partnerships in corporatist economies, in order to clarify their difference from partnerships in deregulated economies.

Partnerships in deregulated economies

Partnerships in deregulated economies take two overlapping forms: between business and education, and between business and the community. Linkages are decentralised at the regional level, and lack a co-ordinating structure at the national level.

Business-education partnerships

Business and education partnerships may take a variety of forms, some of which have already been mentioned in the section on employers' roles. A comprehensive list may include the following: *i)* employers donating equipment or finance to schools, *ii)* employers' involvement in curriculum development, *iii)* business representation on school governing bodies, *iv)* business financing students to set up and operate enterprises; *v)* teacher placements in business; *vi)* work experience placements for students; *vii)* businessmen giving presentations/seminars at schools; and *viii)* businesses guaranteeing a job or job interview after successful completion of school assignments (compacts, for example).

Each type of activity has different implications with respect to finance and businesspeople's time. To sustain a partnership, the benefits employers can derive must outweigh the costs (in time and money). These benefits can include securing: *i)* better motivated and educated young people for recruitment; *ii)* a chance to make a positive contribution to their community; and *iii)* an opportunity to influence the curriculum.

Evidence exists of limited success, in the form of increased summer job and regular job placements for school leavers particularly from ethnic minorities (see NCEE, 1990, pp. 106-107 for Boston Compacts).

A number of actual and potential pitfalls exist in these partnership activities. First, most linkages are intensive in their resource use, as face-to-face contacts between employers, teachers and students must take place. This intensity may explain why these partnerships have declined in the United Kingdom since 1986, Industry Year (Department of Education and Science (DES), 1990).

Second, in the British case, business-education partnerships have been too diverse, fragmented and hence, opaque. The resulting "alphabet soup" of abbreviated link schemes reflects the local, voluntary nature of this type of activity, and the bewildering array of small-scale initiatives launched by the central government over a short space of time. Although there has been a tendency towards consolidation, an overlap in functions between three government ministries (Department of Education and Science, Department of Trade and Industry, Department of Employment) has contributed to confusion for employers wishing to initiate different linkages.

Third, business-education partnerships have been conceived to be employer-led. Any joint venture is unlikely to succeed unless each party is getting something out of it, and each party's expertise is given due respect. In the UK, however, the lack of public funding for schools and teachers' salary has led to the education sector feeling undervalued in society; they may feel forced to enter into a relationship of dependence on business to get access to public funds or to business donations. Schools may also resent the idea of too much business representation on governing bodies as an intrusion into their area of expertise.

Lastly, through these partnerships, schools are asked to meet industry needs by shedding their anti-industrial values. However, these linkages may not be sufficient for industry to transform its own values towards education and training. Thus, if employers are prone to making business decisions on the basis of short-term profitability, their needs for strengthening links with schools may fluctuate with the economic climate. Only if employers are committed to training and retraining their existing workers through a recession would they devote any resources to link activities over the long run.

Business-community partnerships: PICs and TECs

Like business-education partnerships, business-community partnerships have been created in the 1980s in the US and the UK. The objectives of such partnerships include:

i) regional self-regeneration through employers injecting an entrepreneurial spirit into the local community;
ii) the administration by employers of public employment and training programmes as they see fit to meet local needs;
iii) the allocation of public money according to market forces, using a contract bidding system; and
iv) the monitoring of performance measured in terms of outcomes such as the number of qualifications obtained and the number of trainees placed in jobs.

Private Industry Councils (PICs) in the US and Training and Enterprise Councils (TECs) in the UK have slightly different sets of aims, but they are both regionally based, employer-led bodies formed voluntarily by leading local businesses. They have a corporate structure, and are run by business executives responsible for defining a set of local targets.

A number of points merit discussion. First, the extent to which other actors in the local community are consulted by PICs and TECs differs from one council to another. There is a tendency to regard the local education authority as a major actor because of the initiatives on business-education partnerships, but close associations with public sector employers, trade unions, and voluntary organisations may be just as important for the successful operation of PICs and TECs.

Second, a diversity in the local targets and provision of VOTEC is valued in the name of meeting local needs. However, the needs of some employers, particularly large ones with local branches, are national. A decentralised training structure may be costly for them. Moreover, regional sensitivity in manpower planning may not be appropriate, given the national tendency toward valuing broad-based education and training. Particularly if local employers' needs are for well-motivated and educated young people, the need to cater for regional diversity in customised VOTEC contents appears to be slim. Too much regard for local diversity may lead to geographical gaps in the network of TECs or PICs, which may be filled only through setting up a statutory national framework for TECs (and PICs) (Bennett *et al.*, 1989).

Lastly, the same criticism which applies to all employer-led systems applies to TECs and PICs. Employers are expected to inject an entrepreneurial spirit into the local community; at the same time they transform their own attitudes towards human resources. Linkages with the local community do not seem to be the most effective method for bringing about a change in employers' attitudes to training. Nor do such linkages change employers' financial incentives to provide training.

Social partnerships in corporatist economies

In regulated economies, such as Germany, attention is focused on the partnership between "social partners", including employers' associations and trade unions. The social partners work together to legitimate the training process; unions exercise wage restraint to preserve employers' financial incentive to provide training, while employers make sure that enough training places are offered to absorb school leavers even in bad times. Within a framework of consensus about the importance of training for long-term prosperity, employers and trade unions exercise checks and balances upon each other in the regulation, financing, implementation, and monitoring of training at many levels: in the workplace, regionally, and nationally (Streeck *et al.*, 1987).

The complex networks of employers (and their associations) and unions helps create a consensus between social partners. Such a set-up has an advantage in enhancing the effectiveness of policy implementation, as social partners can own up to the policy decisions they have influenced. It also has a disadvantage, however, in slowing down the

rate of change, as policies upon which no consensus is reached (for example, the national training levy in Germany) tend not to be implemented.

The relative absence of reference to partnerships between business and education in Germany may be considered curious, given the simultaneous provision of school-based vocational education and employer-based training in the dual system. In fact, mechanisms for harmonising the in-company and school activities of the dual system exist, in the form of the State Committees for Vocational Training and the Federal Institute for Vocational Training's Committee for the States (CEDEFOP, 1984). These committees, however, are tripartite with representatives from employers, employees and the State. The active involvement of the State in the process of VOTEC provision and standard setting distinguish the German set-up from partnerships in more deregulated economies.

To summarise, partnerships in corporatist and deregulated economies refer to very different things. First, partnerships in corporatist economies are between employers' associations and trade unions. They jointly regulate and monitor VOTEC at the national, regional, sectoral and workplace levels. By contrast, partnerships in deregulated economies are between business and education, or between business and the community, with businesses taking a leading role in providing and financing VOTEC. The local level of co-ordination, often established bilaterally between one employer and one educational institution, is independent of other levels of co-ordination. Second, as a result of these differences, trade unions are given a legitimate role to participate in regulating the training process, and outcomes, in corporatist economies, whereas their role tends to be supplanted in deregulated economies.

6. Summary and issues for further discussion

This chapter focused on the roles employers and trade unions play in facilitating the transition for young people from school to work. The respective roles were analysed within a conceptual framework which consisted of two parts. First, vocational and technical education and training systems may be classified as either dual or sequential, according to *i)* whether or not young people assume a trainee or apprentice status in the transition, *ii)* whether employer provision overlaps with, or follows sequentially after, provision by the education sector, and *iii)* whether or not there is a mix of learning environments in classrooms and workplaces. Second, the nature of co-ordination among actors, including employers and unions, to regulate the provision of VOTEC was classified into state-led, corporatist, and deregulated modes. By their very nature, employers' associations and trade unions play a greater role in corporatist arrangements than in deregulated economies.

Employers' and trade unions' roles were then examined. Their functions were broadly categorised into those which concern the interface with the education sector, those which promote young people's incentives and opportunities to learn, and those concerning the provision and financing of education and training. Employers and trade unions may agree that all young people ought to have access to good quality education and training opportunities. But there may be conflict of interests, and disagreements over

respective responsibilities, not only between employers and trade unions, but also among employers and trade unions.

In lieu of conclusions, the following provides a number of questions arising out of the above analysis in the chapter which remain unresolved.

a) *What should be the respective roles of the education sector and employers in providing a good learning environment?*

Various settings for learning exist both within educational institutions and within enterprises. The only setting which is the monopoly preserve of employers is on-the-job training which promotes learning in a more meaningful context than is typical in classrooms, although the quality of the learning process varies according to whether supervisors and other older workers can give supportive advice to young trainees. All other settings can be provided just as well within schools/colleges as within enterprises. They include classrooms where teachers set the pace of instruction, and more self-directed learning. A policy choice appears to exist over the extent to which enterprises ought to be encouraged to become "learning organisations". Some organisations have stuck to their traditional role of developing their employees' work-related skills. Others have become more ambitious in giving employees education leaves at their own college campus as part of the benefits package, so that employers take on the traditional role of educational institutions in providing broad educational opportunities. The more educational institutions are asked to meet the needs of the economy, and the more enterprises come to provide continuing education for personal advancement and fulfilment, the more blurred the respective roles of the education and corporate sectors become. Consequently, attention must be focused on how nations can introduce work-based learning into the education sector, and classroom-based learning by employers, so as to smooth the transition from school to work.

b) *Is there a case for promoting an employer-led VOTEC system as a "best practice" model? If so, what are the roles other stakeholders can play in making it well functioning?*

With respect to "best practice", it depends partly on making a judgement about whether employers are indeed the best judge of the future needs of the economy, given that broader and flexible skills requirements are rendering such forecasting more difficult and uncertain. It also depends on what employers are expected to do, and what they are capable of doing. Some of society's expectations of employers may be too ambitious. Clearly, asking employers to provide remedial education in literacy and numeracy is less viable in the long run than expecting them to provide broad-based training. The nature of employer-provided education and training will depend on the competence of managers and the relative power of other stakeholders (banks, employees, etc.) within the enterprise to influence its long-term behaviour.

Potential pitfalls of the employer-led system include *i)* cyclical fluctuations in VOTEC provision, *ii)* underinvestment in VOTEC due to market failure or lack of co-ordination between employers, *iii)* a tendency to provide narrow job-related skills training

only (if the work organisation is outdated and rigid), and *iv)* a cost-effective but inegalitarian tendency to concentrate VOTEC provision on better educated workers.

Employer-led systems may avoid some of the above pitfalls in a number of ways. First, the State may intervene to enforce a levy system so that at least the underinvestment problem is resolved. Second, employers themselves may rely on their associations to control and monitor each other's behaviour, so as to ensure their collective interest in providing a sufficient level of training overall. Third, unions may negotiate to alter the nature of industrial relations and work organisation in order to transform enterprises into learning places – and then, exercising checks and balances whenever recession and restructuring may tempt employers to shift the burden of retraining to individuals and the State. Fourth, other policies which would help employers enhance their training effort include: management education to diffuse best practice in human resource management, good growth-oriented macroeconomic management, and institutional reforms (particularly in financial institutions, to promote long-term investment in both human and physical capital). None of these policies are mutually exclusive, but the ease with which they can be implemented in any country depends on whether there is already institutional support for them or not. Moreover, bringing about changes in attitudes, either through education or through institutional reforms, is likely to take a long time to take effect.

c) *Do business-education partnerships have a future?*

Partnerships do have a future, if their aims are kept narrowly focused, if transaction costs can be kept low, and if mutual trust and commitment develop between employers and schools. In other words, for these partnerships to be viable in the long run, they must pass both the cost-benefit and effectiveness criteria for success discussed earlier. Some objectives of business-education and business-community partnerships can better be achieved by alternative means, however. In particular, changing employers' attitudes towards training, so that they come to treat training costs as long-term investment rather than current expenditure, is unlikely to be brought about merely by the public sector's exhortations. Such a change would require institutional reform in some other areas (especially financing of industry), and in management education, so that employers come to see these partnerships less as an altruistic act of charity and more as part of their long-term interest.

d) *How can employers and unions meet the needs of different groups of young people without undermining their motivation to learn and work?*

Business-education partnerships are partly about catering for individual needs, so that businesses may tailor their education and training contents to suit different learning abilities. Providing different learning environments, as discussed above, may have the advantage of ensuring that each young person can learn in the most appropriate environment. Ideally, how young people acquire skills may be totally divorced from the certification of those skills, so that young people who obtain a particular skills qualification along different pathways may enjoy equal opportunities in the labour market.

In reality, however, there is a tendency for particular educational and skills qualifications to be associated with specific educational or training processes. Thus, a diverse and

flexible system caters for the needs of different groups of young people, but is likely to create provisions deemed exclusively for problem groups, which may in turn stigmatise those programmes in the eyes of employers.

By contrast, a comprehensive system, with a single dominant mode of vocational education and training provision as in Germany, has commendable clarity and transparency. Both young people and employers have a clear idea of progression routes with qualifications at each stage. It may be argued, therefore, that a comprehensive system with a single main route of progression provides just as strong a motivation for all young people to learn as a diverse system offering a choice among different pathways.

NOTES

1. According to one estimate, 10 per cent of German youth leave school without any satisfactory school-leaving certificate (S.J. Prais and Karin Wagner, "Schooling Standards in England and Germany: Some Summary Comparisons Bearing on Economic Performance", *National Institute Economic Review*, May, 1985, p. 56). For Japan, where 94.5 per cent of 15-year-olds go on to post-compulsory senior high school, the Ministry of Education estimated that 120 000 senior high school students, or just over 2 per cent of the total enrolled, were dropouts in 1989 (*Asahi Newspaper*, February 15, 1991).
2. A survey by the British Department of Education and Science in June 1989, involving 500 secondary schools, showed that 40 per cent of them had involvement by local industry and curriculum development, while 48 per cent received technical advice and 42 per cent specialist equipment (Department of Education and Science, "School/Industry Links", *DES Statistical Bulletin*, October, 1990).

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Chapter 7

POLICY INTEGRATION AND CO-OPERATION A PERSISTENT CHALLENGE

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This chapter examines contemporary understandings of policy integration and focuses particularly on the problem of co-operation in the implementation of VOTEC policy. These problems, and alternative approaches to resolving them, will be illustrated by drawing on examples from the United States, Australia, Japan, and certain European countries. All of these countries face particular problems of policy co-ordination. They have been chosen because they represent a mix of large and small states, federal and unitary systems, and illustrate a wide range of relationships among social partners (employers and unions) and levels of government.

It is inevitable that different ministries and agencies of government will establish different priorities as they respond to the different interest groups and constituencies with which they are most closely connected. Policy integration entails two complementary activities: one approach to policy integration is to reduce this competition as much as possible, and the other is to accept the existence of competing objectives and to find practical ways of managing it in order to maximise effectiveness. Since it possible to try a bit of both, the two approaches can be seen as complementary. The difficult trick is to achieve a trade-off among the ministries and agencies, thereby minimising the gross waste of resources which occurs when these agencies act at cross-purposes.

The integration of objectives and co-ordination of actions on which this chapter focuses can be discussed in terms of a horizontal and a vertical dimension, or in terms of horizontal and vertical "linkages". "Horizontal linkages" involve agreements among high-level policy actors – social partners, ministries and government agencies – concerning overall social and economic objectives. These agreements encompass both aspects of policy integration referred to above. That is, horizontal linkage refers to the management of competition among agencies as well as the reduction in the extent to which agencies strive to fulfil incompatible goals. "Vertical linkages" refers to the effectiveness with which policy agreements achieved by these key actors are implemented at the state and

local levels. This dimension focuses on asking how effectively national policies are translated into ways of developing young people's skills in the classroom or the workforce.

On either the vertical or the horizontal dimension, the scope of the co-ordination problems and the willingness to address them will vary greatly from country to country. In the United States, horizontal linkages have been largely neglected, though this may be changing under the Clinton administration. Elsewhere, horizontal linkage has sometimes gone beyond attempts to rationalise education and labour market objectives. In France, Denmark and Germany, horizontal linkage or co-ordination includes industrial relations agreements as well, and broad agreements of this sort were also negotiated in Australia during the 1980s. In the United Kingdom, attempts during the 1980s to co-ordinate education and labour market policies largely failed, while in Sweden, earlier agreements broke down with the collapse of the historic social-democratic consensus.

The first step in this exploration of policy co-ordination and integration is to recognise the multiple functions of VOTEC. Policy integration is not a talisman: it can have baneful rather than beneficial consequences (Section 1). However, there is something to be learned from the downside of experience with attempted policy co-ordination (Section 2), as well as from the upside (Section 3). Even if there is not one "royal road" for everyone to follow, and there are different destinations, certain general conclusions about creating effective horizontal and vertical linkages can be drawn (Section 4).

1. The multiple functions of VOTEC

The target group for VOTEC policy are young people who are either in employment or who are enrolled in schools and colleges which aim to prepare them for entrance into qualified work. Initial VOTEC carries at least four inter-related functions: sorting cohort members into different educational and training pathways, regulating the flow of young people into the workforce, preparing young people for entry into the workforce, and improving the productivity and trainability of those who will become the workforce of the future.

It is obvious the first two functions are not primarily educational. In fact, they serve the purpose of social control, in the sense that VOTEC is often a very important means of warehousing people when the labour market is not clearing. That is to say, when at current wage levels the supply of labour is not entirely taken up by the demand, adjustments are necessary in order to avoid socially unacceptable levels of unemployment. This problem may be managed in various ways, but many countries have been tempted to use VOTEC as a relatively cheap parking lot. Thus, training policy can be used either to keep people out of the labour market altogether, to give them partial paid employment at low wage rates, or to trickle them into employment as local conditions permit so that unemployment rates do not rise.

Successive British schemes from Work Experience on Employers' Premises (WEEP) through to the current version of Youth Training (YT) illustrate these features. In the United Kingdom and in other industrialised countries, schemes like WEEP and YT

were established during the 1980s on a massive scale but with very low per capita costs. Because the training content of these low-cost programmes was either inadequate or was poorly related to local labour market needs, participation in these programmes rarely guaranteed a good start to working life. For example, on the basis of a Scottish survey of YT trainees, Raffe (1988) found that five or six months after the end of their training, one-third of the trainees were still working full time with their YT employer, one-third had found a job elsewhere, and one-third were unemployed. Because the training was usually job-specific, very few gained externally recognised credentials. Another YT survey found that, compared with youth who had spent an equivalent period unemployed, YT trainees were only 20 per cent more likely to find a job at the end of the training year (Main and Shelly, 1988).

Programmes such as YT typically reflect the orientation of labour ministries, in the sense that recruitment and labour market attachment tend to be favoured over training and the acquisition of portable credentials. As David Raffe commented in Chapter 4 of this volume, from an education ministry perspective, the failure to complete a programme and gain a credential is seen as a failure, whereas from a labour ministry perspective, young people who left the scheme because they had been recruited by the firms they were working for were regarded as successes. Competition among ministries which hold different policy objectives for youth can clearly have perverse effects.

A successful example of policy co-ordination – one which largely resolved the competition among alternative policy objectives for youth – comes from Australia in the 1980s. Early in the decade, government income-support policies reduced the financial hardships of young people who were unable to find work, but they had the perverse effect of encouraging teenagers to leave school in order to collect unemployment benefits. Between 1985 and 1988, the signals were changed: instead of receiving benefits if they left school, Australian youth now receive benefits if they stay on at school or continue their training in the Technical and Further Education System (TAFE). The upper-secondary curriculum, which at the beginning of the 1980s was the almost exclusive preserve of those preparing for university admission examinations, was diversified. Australia's new curriculum and assessment policies recognise that high school graduation now serves broader purposes and a more diverse population. During the 1980s, the national high school completion rate virtually doubled, from about one-third of each age cohort in 1982 to over two-thirds by 1992 (Vickers, 1991; Howe and Vickers 1993, p. 36).

Successful acquisition of recognised entry-level qualifications is the primary objective of both general secondary education and VOTEC. While politicians are very ready to espouse this prime objective, they are understandably reluctant to acknowledge that, in practice, VOTEC is often used to regulate the flow of young people into the workforce thereby disguising the problems of unemployment. They are also reluctant to acknowledge that VOTEC, much more than general secondary education, is powerful in allocating life chances to individuals. Because much of VOTEC is occupationally specific, VOTEC choices often set the educational pathway of young trainees once and for all. Countries like Sweden and France have constructed long-term policy initiatives in an attempt to counter the once-and-for-all nature of the initial stratification which occurs at this stage in young people's lives. However, even when initial education and training

systems are relatively meritocratic in their selection criteria, the inevitable consequence is to discriminate against some citizens.

Returning to the ways in which VOTEC policy is used to regulate labour supply, it is important to note that the casualties of different labour market systems are not always the same. In other words, the identity of those who will suffer first from a downturn in employment varies markedly from one country to another. In the United Kingdom, it is young people – especially those from ethnic minorities – who bear more than a fair share of the burden of economic adjustment. Young people have been a far more favoured group in Germany, where the greatest disadvantages are experienced by women, guest workers and middle-aged male clerical workers.

When the overall levels of education and training among OECD Member countries are compared, the British labour force does not rank highly (OECD, 1992, pp. 68-77). In a now-or-never education system, almost 30 per cent of England's youth leave school around age 16 and only a third complete a full academic secondary education leading to A-level qualifications. In the vocational sector, the newly developed system of National Vocational Qualifications (NVQs) set very low expectations for occupational competences. Analysts such as Jarvis and Prais (1988) have claimed that the NVQs may legitimate low-level training and perpetuate a certificated semi-literate underclass in England and Wales.

The United Kingdom's failure to invest in developing the skills and capacities of its workforce contrasts with the situation in highly educated Japan, where the proportion of the population with a university degree is almost twice as large while the proportion with non-university tertiary qualifications is roughly the same as in the United Kingdom (OECD, 1992). Educational disadvantage still exists in Japan, but is based on gender rather than class. Japanese Ministry of Education statistics show that fewer than 5 per cent of the 500 000 women university students in Japan are enrolled in science and engineering courses, whereas some 30 per cent of their 1.5 million male counterparts are enrolled in those fields. Of course, Japanese women are entitled to apply for such programmes. But their low levels of participation reflect deterrent features of forms of work organisation that discriminate heavily against women. The initial VOTEC system itself does not have to be overtly discriminatory. It is not, of course, peculiar to Japan that a lopsided allocation of life chances between genders arises because work is organised by and for men. Lack of provisions for maternity leave and poor promotion prospects for women together with the marked lack of female role models among the technological and managerial elite leads to disincentives which feed back into the initial VOTEC system. If one-half of an age cohort can be successfully inhibited from developing its potential this reduces supply pressure on the labour market and systematically distributes life chances in favour of the other half.

The baneful long-term effects of consigning large fractions of each youth cohort to severe personal underdevelopment are well documented in the United States:

> "In our expectations for young people, the resources that we devote to them and the rewards for performance that we give them, our whole system conspires to produce minimal educational effort or achievement among our students who are not college bound" (Commission on the Skills of the American Workforce, p. 43).

A sort of life sentence is handed out to the "forgotten half" of young Americans who are not on the college track. American employers chiefly train their best-educated employees, so initial distributions of learning opportunities and of skills are reinforced throughout working life. Using longitudinal data for the 1967 to 1980 period, Lillard and Tan (1986) found that the likelihood that workers received some form of training from their employers rose with the level of schooling completed, up to the baccalaureate level. This finding holds true for both men and women.

This finding understates the actual discrimination against those with the lowest levels of initial education. No less than two-thirds of all company training dollars are spent on college-educated employees, a phenomenon which is scarcely less marked in other OECD countries. There is overwhelming evidence from decades of research that attainment in initial education is crucial to life chances. This is true even in Sweden, a country which has devoted more intelligence and more resources to recurrent and second chance education than any other OECD country (Tuijnman, 1989). The disadvantage of poor initial education and training is systematically cumulative. Only 20 per cent of Swedish adults with no more than nine years of schooling take part in any form of adult education compared with 60 per cent of those adults who experienced post-secondary education.

The United States, Japan and the United Kingdom all show in different ways that policies may be both coherent and pernicious. In other words, a whole system can, in effect, "conspire" to minimise educational effort among some large fraction of young people and consign them to lifelong underachievement. Therefore, the poor performance of nations in the education and training field is not simply attributable to poor policy co-ordination. In the United Kingdom, the problem is, for the most part, a chronic infirmity of political will. Governments opted for long-term and gradual national failure in economic performance rather than incur the electorally more dangerous costs of imposing training regulations on employers or raising general taxation revenue to cover the costs of improving the nation's education and training systems.

2. Initial VOTEC: sources of failure

Competing incentives reduce retention rates in VOTEC

Once compulsory schooling is completed, a nexus of incentives and disincentives begins to influence the choices young people make among different pathways. At this stage, competing incentives among different government programmes as well as the attractions of full-time work itself can reduce retention rates in education and training programmes. The choices young people among school and work depend on both the short-term and long-term economic and social costs and rewards they perceive to be attached to these choices.

It is a bitter truth that, in low-income households, the choices of young people to avoid full-time education and training in favour of full-time work may be entirely rational. In poorer households, the private costs of post-compulsory education and train-

ing can be too high because these households cannot afford to forego the income from juvenile earnings. There may be a lack of co-ordination among income-support policies of the kind already referred to in Australia before 1987. In this context, the short term monetary gains from leaving school and collecting unemployment benefits were large enough to discourage some students from staying on. Today, the Australian government pays student allowances that are at least equal to the value of teenage unemployment benefits.

However, the problem can be more deep-seated than a failure of public policy co-ordination. It can grow out of the entire structure of juvenile and adult earnings. Juvenile earnings represent a much higher proportion of adult earnings in the United Kingdom (where 20 per cent of youth drop out of school by age 17) than in Germany (where 8 per cent drop out by age 17). The solution to problems such as these requires comprehensive labour market policy reform. This is easier to do if, as in Sweden and Australia, there is a centralised wage-bargaining system. In the United States and increasingly in the United Kingdom, where there is no such thing, the manipulation of the short-term economic incentives affecting youth can be difficult indeed.

In some countries the rather shrunken contemporary youth cohorts meet high levels of employer demand. Once in employment, the young worker's advancement is not much influenced by lack of vocational qualifications. This depends partly on how firms are organised, and since this varies from country to country, the costs of private investment in VOTEC may be higher and the earnings yield lower in one country than in another. Studies of the private life of French and British firms reveal a very different culture from that in German firms (Maurice *et al.*, 1979; Sorge and Warner, 1980; Lutz, 1981). Access to jobs in the United Kingdom is far more arbitrary and likely to be influenced by seniority considerations – by the powerful company culture – than is the case in Germany, where both the internal and external labour market behaviour of firms reveals a strong respect for qualifications. The choices of young people reflect profound differences in relations between education systems, labour markets and firms in the countries where they live.

The capacity of school systems seems to be undermined where there are strong incentives to early leaving, as has long been the case in the United Kingdom. These incentives come from the labour market and the workplace. However, labour market incentives can be managed to produce an almost irresistible demand for either full-or part-time VOTEC. In Japan, it is full-time schooling which is the beneficiary of these extra-educational forces. In Germany, the world's most comprehensive and detailed regulatory framework for apprenticeship training establishes training-quality benchmarks and specifies the VOTEC certificates required for entry to the skilled occupations and trades. As a result, the VOTEC system in Germany is so strong that about 60 per cent of each age cohort qualifies through the dual system, which includes part-time attendance at vocational or technical schools.

A VOTEC system which is working with the grain of the labour market is likely to be more effective than one which has to battle against the incentives which are intrinsic to the system. Where initial VOTEC is comfortably supported by public provision but is divorced from the currents of the economy it may not be responsive to its emerging needs. It may then be essential to disembed VOTEC in order to induce a necessary

responsiveness. This is true of Sweden today. On the other hand, if initial VOTEC is too strongly focused within the enterprise, both the linkage of enterprise skill formation to the external labour market and the nation's capacity to generate sufficient transferable skills can be seriously impaired.

Emergency programmes rarely improve the quality of VOTEC

Another cause of indifferent performance in VOTEC systems arises from a predilection for ad hoc public interventions in the form of emergency programmes grafted onto regular provision. For example, when the dual system was under maximum strain because employer offers of training places were inadequate to the needs of young people, Germany resorted to quite heavy use of foundation training for 15- to 16 year-olds in the so-called Basic Vocational Training Year (BVY) (Münch, 1984). Although declared an integral and legally binding part of vocational training by the 1969 Vocational Training Act, the BVY's full-time school-based form departs from the basic philosophy of the dual system by replacing the first year of on-the-job training combined with part-time attendance at the *Berufsschule*.

Training administrators have found it difficult to decide whether the full-time school version of BVY should substitute for a complete year of a standard apprenticeship. As a result, initial training has been lengthened by up to a year. Young people on this form of BVY are indeed students, rather than simultaneously trainees and students like their contemporaries training in the dual system or in the alternance version of BVY, where the trainees/students have training contracts with firms. In practice, neither form of BVY really helped very young people to make a rational occupational choice. Sensible choices were made difficult because BVY tended to be used by the least eligible young people, at a time when it was difficult to find a training place of any kind. Even in the alternance form of BVY, where the trainee/student has some on-the-job training, the training place was in one particular occupation, the training firm had no obligation to keep successful completers, and some employers were hostile to its products. So BVY has proved to be a graft which has never "taken" properly. It failed to improve the prospects of too many of the least advantaged young people.

The school-based version of BVY has been rather expensive. Short of funds, *Länder* have tended to favour the alternance version. Short of work, the *Berufsschule* teachers' associations favoured the full-time school version. During the training places crisis of the dual system (chiefly 1979 to 1983), considerable use was made of the BVY, and then less use once the number of available training places grew to exceed (by 1987) the number of registered applicants.

A review of the activities of the UK Department of Employment provides numerous examples of emergency grafts, most of which have been only moderately successful. For over ten years the British have been experimenting with relatively short programmes which would help unemployed young people enter the workforce. Earlier schemes offered opportunities for work experience alone. More recently under the Youth Training Scheme (YTS, now known simply as Youth Training) attempts have been made to mix experience with training, and some programmes even offer training for specific vocational qualifications.

The existence of YTS has helped to give at least surface respectability to British training statistics relative to those of other countries (Stevens and MacRay, 1991). The percentage of British 17-year-olds in part-time training programmes rose from 27 to 40 per cent when a two-year YTS was introduced (Stevens and Walsh, 1991, p. 28). But in terms of depth and quality, the average YTS traineeship did not compare well with the German apprenticeship system, the Danish EFG programme, or even the two-and-a-half year Dutch apprenticeship programme. Most YTS programmes were at a distinctly lower level than their German, Danish or Dutch counterparts and, unlike them, did not normally yield recognised vocational qualifications with good labour market currency. The unsatisfactory nature of YTS was underlined by its recent transformation into Youth Training (YT). For the first time, this is a vocational qualification-driven scheme, in which a fixed training period has been replaced by one which varies according to the time needed to achieve an agreed target qualification.

YTS was a classic emergency programme. Despite some notable exceptions, where progressive employers were involved, it made no appreciable contribution to the quality-assured skills of the labour force. Its very low-level certificate accounted for 0.2 per cent of all vocational qualifications achieved in 1989 (Stevens and Walsh, 1991). Its main benefit was that it supported a large proportion of the UK's earliest school leavers, thus reducing the length of the unemployment lines. But under YTS, many trainees received little effective training beyond a cursory induction to working life in the firm that employed them.

A great deal of the so-called "off-the-job" component of YTS training occurred within the participating firms. By avoiding recognised programmes offered through the UK's Further Education colleges, the quality of the training component of YTS was seriously eroded (Lee *et al.*, 1990). Many employers with YTS trainees saw them as cheap and disposable labour, and in many cases, employer commitment to training was very limited or even non-existent (Lee *et al.*). Many employers were looking for ways to avoid real training obligations, not to incur them (Keep, 1986). In effect, the YTS legitimised the existing practices in the UK whereby a quarter of each year's school leavers go into jobs without the benefit of systematically/planned training. YTS, like its predecessors, did not represent a durable extension of the country's VOTEC system.

The academic/vocational status gap distorts provision and choice

A criticism often levelled against initial VOTEC is that it prevents young people from following educational pathways that are appropriate to their capacities. In choosing among the alternative education and training pathways available to them, parents and students are often influenced by the fear that enrolment in initial VOTEC will prevent progression to higher-level technical or academic courses. Indeed, many VOTEC systems do exhibit both horizontal and vertical blockages for which there is no sound pedagogical rationale. A major reform effort in the United Kingdom is attempting to engineer transferability of credit between the school-based system of academic qualifications and the comprehensive national structure of vocational qualifications which is being elaborated by the National Council for Vocational Qualifications (NCVQ).

Although such questioning and re-engineering of qualification structures is desirable, it tends to divert attention from even more serious inefficiencies and distortions which arise from the high status of the so-called "academic" relative to the "vocational" tracks or streams. In the first place, the problem is frequently mis-specified. High status "academic" programmes can be either exclusively devoted to or include major elements of advanced vocational education and training, especially for lawyers, doctors, Masters of Business or *énarques*. There is an enormous gap on the one hand between high-status institutions which are intensely vocational, such as France's *Grandes Écoles* or America's business schools, and the equally vocational but lower status institutions which train craftsmen and technicians on the other.

The gulf between these two forms of vocational training has damaging effects, since it is at the sub-degree level that many modern economies are now experiencing crippling skill shortages. In the 1980s, the French recognised the negative effects created by the traditional bifurcation of vocational training into elite and the menial, and they have now created numerous programmes at levels which lie between the two extremes. The need to scale up the provision of these sub-degree skills is perhaps the most important challenge facing most VOTEC systems. As early as 1971, Morris and Ziderman (1971) found that rates-of-return to sub-degree vocational training in the UK exceed that for first degree and postgraduate level training. Subsequent rate-of-return studies confirmed this finding and found that the relative benefits of sub-degree training are especially high if the training was undertaken on a part-time basis. Yet British underinvestment in sub-degree training has not yet been corrected.

Even France, which has done so much to lift its output of skilled technicians towards German levels, still allows its Lycées to foster the attraction of young people for studies leading to academic degrees. In consequence, the groaning school system is overflowing with candidates seeking the *baccalauréat* – their ticket of entry to higher education. In 1989, 29.7 per cent of all those in their final year were over 19 years of age, retaking, and retaking the three principal and indubitably academic streams of the *baccalauréat* in the hope of gaining admission to a university (Dufay, 1990, p. 30).

The competitive instincts of young people and the reward systems of labour markets tend to overproduce graduates and underproduce technicians. Even the process of placing more and more graduates into hitherto "non-graduate jobs" on entry into the labour market and eroding their earnings differentials over scarce technicians still has not yielded a major re-adjustment in patterns of student choice. Once more, the key to a VOTEC phenomenon lies in the labour market and the workplace, so any solution has to involve policies focused there as well as on the VOTEC system.

Lack of industry-education synchronisation

VOTEC systems develop a momentum of their own, rather like health or defence systems. In times of rapid technological change, therefore, colleges and schools may end up sustaining programmes which have little relationship to the needs of industry. Such a mismatch arose in Australia's Technical and Further Education system in the early 1980s. In the middle 1980s Australian industry begin to analyse its unmet needs, while the commonwealth and state governments set in train constitutional and financial reforms

which would enable colleges to respond directly to employer requirements. The TAFE colleges began to relate more effectively to the business strategy of employers and to emerging federally supported industrial policies.

For many years, Sweden has provided free adult basic education (*Grundvux*), comprehensive intermediate-level adult education (*Komvux*) and extensive re-training for unemployed or redundant workers through the Commission for Labour Market training (AMU). A series of reforms to these institutions, initiated in 1990-91, suggest another strategy for improving the synchronisation between educational provision and economic need. These reforms show how local provision of basic post-compulsory education and training can be forced to address the quality and quantity requirements of employers if the financing of programmes is opened up through competitive tendering. A key strategy in the Swedish reforms was to change the role of the AMU, Sweden's leading training institution.

In the past, the AMU had a monopoly over the provision of labourmarket training as well as its financing. Today, each AMU centre competes with other training providers, including the *Komvux*, the folk high schools, and the adult education associations. All these potential providers vie with each other in seeking to provide market-priced courses to companies and other buyers. In the past, the AMU was a government department with assured funding; it both financed and provided training. Now the power to purchase training and the responsibility for providing it have been separated, even where government money is involved. This reform is just one part of a broader process which is making providers more cost-conscious and more entrepreneurial in designing and marketing courses to fit the needs of both companies and individuals (Clement *et al.*, 1993)

These changes signal a decentralisation of decision making and a movement away from the intensely corporatist nature of the Swedish system. One of the symptoms of the collapse of the Swedish model in 1989 and 1990 was the appearance of marked wage drift at plant level. This drift fatally undermined the centrally negotiated national agreements on wages between government and social partners. Nevertheless, firms widened their earnings differentials at plant level and inflation rose well above the OECD average.

The central pact on which the effectiveness of the Swedish model rested, failed to deliver the control of inflation which was supposed to seal the bargain. This wage drift resulted from excessively tight local labour markets in which employers could not get or retain the highly skilled workers they needed. Until recently, in Sweden, a combination of lavish social security arrangements and inadequate rewards for skills has meant that manufacturers, in particular, find it difficult to staff their factories. The Swedish example shows that it is possible to construct a beautifully structured system of educational provision which nevertheless fails to meet industrial needs because institutional management and labour market management are not efficiently related to industrial need. In other words, *i)* strong financial incentives linking individual schools and colleges to industrial needs are missing, and *ii)* the wage rewards for skills are insufficient to provide incentives for individuals to train.

Competence-based certification provides a useful signal to the purchaser of skills, and competence-based wage structures can provide the individual with a strong incentive to train. In Australia, the commonwealth government understands this and has promoted a

reform of the organisation of VOTEC in order to co-ordinate policies for certification and policies for restructuring the wage awards. In Sweden the widening of plant-level earnings differentials is being amplified by government taxation policies so as to further widen after-tax disposable income differentials. These widening differentials send strong messages about the value of investing in industrially relevant education and training to both present and future workers. In both cases radical conversion to a new set of harmonised policies followed from accurate analysis of a lack of co-ordination which was contributing to an inefficient national skill formation effort.

Failure to encourage investment in training

Throughout the 1980s, governments in the United States and the United Kingdom did little to promote higher levels of private sector investment in firm-based training provision. Even where the government itself was largely footing the bill (as in the case of the UK's Youth Training scheme) firms were more or less allowed to do as they pleased. The US and the UK also have very low levels of wage regulation, in contrast with countries like Australia, Sweden and Germany, where occupational certification, licenses to practice particular trades or professions, and wage rates, are more closely linked. It is no accident that the US and the UK also have the least regulated of the VOTEC systems in OECD countries.

There are a number of different ways in which countries can frame the operations of firms in the labour market without interfering with the right of firms to manage. They can regulate their financial systems, as in Switzerland, Germany or Japan, in order to make a reality of what the Swiss call "patient capital". This financial regulation means that firms are able to take as long a view on the yield from investment in intangibles like training or research and development as they are on investments in tangibles like equipment or factories. Financial structures of this kind are complemented by labour market structures which enhance the returns to both individuals and companies on investments in training. Incentives for firms to train are provided in different ways in every OECD country, but by and large, the results are similar.

The contrast between these regulated countries and so-called "free-market" countries like the US and the UK is striking. Capital markets in these two countries seek quick returns and most companies treat liquid capital as a volatile resource. There are exceptions. But the exceptional companies in the UK and the US are the norm in countries where capital is a "patient" rather than a "volatile" resource. In the US and the UK, companies expect investment paybacks within two to three years at most. With few exceptions, investments in skills are neither protected by strong internal labour markets nor by low interfirm mobility. The strong competence-based occupational labour markets of Switzerland or Germany, with fat and reliable rewards for skills over the lifetime income stream are only found in particular segments of the labour markets of the UK or the US.

The case for unregulated systems is often put in terms of the superiority of rapid and specific on-the-job learning, the expense and rigidity of off-the-job, institutionalised VOTEC. Competitive, fast-moving companies argue the case for skills which have immediate relevance; the just-in-time philosophy applied to training. The company which

grows in such a business environment is hostile to qualification-based wage systems and to anything which increases the portability and therefore nation-wide currency of skills. The difficulty with this system of skill formation is that in practice it offers insufficient guarantees to persuade either individuals or companies to take a long-term view, to invest in the sort of multi-skilling which is necessary in modern business conditions but cannot be justified on grounds of immediate relevance.

3. Initial VOTEC systems: pointers to success

A common feature of the more successful VOTEC systems is that they all seem to adopt what might be called a "systemic approach" to the structuring of initial education and training. It would be far too simple to say that regulated systems are successful and unregulated ones are not. For a start, it is difficult to find a single system that does not have some form of regulation of either the labour market or the training system or both. Although America's proudest claims lie in the exemplary nature of individual programmes, Americans are accustomed to talking about "the school system" or the "community college system". There is plenty of variation among local colleges and schools, but they still constitute a recognisable system. This is less true of the American labour market, but even there, a degree of regulation exists. For example, there are approximately 800 different occupations in the United States that are regulated in some way or another (Hunt, 1992, p. 11).

By way of comparison, prototypically "regulated" systems such as the German system are not nearly as uniform and centralised as one might at first imagine. The German dual system achieves much of its co-ordination through co-determination at the local level. Co-operation among employers, unions, chambers of commerce and public-sector training providers is facilitated by the framework regulations, but co-operation among the partners flows only in part from the existence of the frameworks. In a sense, the co-ordination of the German dual system is not a product of the federal government or the *Länder*. It is a product of a collective determination to agree. Japan provides an even better example of a system which owes more to the profound cultural predisposition of the society to achieve and sustain consensus. The reason why Japanese education institutions harmonise their activities with the needs of big business has more to do with the fact that such synchronisation is deemed appropriate, and less to do with the demands of government regulation (Morishima, 1982, p. 175).

There is no magic in government regulation. Government failure is as common as market failure. But there are advantages in transparency, in the sense that a transparent system provides clear pathways and young people can more easily know how they might gain entry to particular occupational fields. One way of creating a transparent and well structured system is to establish licensing requirements as prerequisites for entry to particular occupations. Another method – one which has regulated the Australian labour market for the last 70 years – is to link qualifications to wage awards. In this system, a recommended minimum wage is specified for each occupation as well as for different levels of experience and training within each occupation. Both these strategies create strong linkages between the attainment of vocational certificates and the individual's earning power.

Licensing requirements are part of labour market regulation for certain occupations in every country, but in Germany such licenses are almost universal. Furthermore, in order to run an apprenticeship programme, a German firm must employ tradesmen or craftsmen with *Meister*-level qualifications in the relevant field. Firms have strong incentives to participate in the dual system because apprenticeship wages are regulated to relatively low levels, typically one-third to one-half of the relevant adult wages for that occupation. Thus, it is common for owners of small enterprises to hold *Meister*-level qualifications in the fields most relevant to their activities.

Because VOTEC is deeply embedded in a particular country's social and economic structure, policy solutions may not travel well, and simplistic recipes for success are unlikely to work. Nevertheless, it is possible to identify particular policies which tend to enhance the effectiveness of VOTEC systems. For example:

- The operation of labour markets needs to be synchronised with the operation of training markets to ensure an equilibrium in the supply of and demand for particular skills. Examples from Australia, Germany and Sweden suggest that, to the extent that intervention increases the incentives of individuals to train and of firms to provide training, a mixture of government regulation and market forces may prove optimal.
- Emergency government interventions in the school to work transition process (exemplified by the British YT scheme) tend to have only a palliative effect. They do not usually produce the durable benefits which are the expected outcomes from long-term, systemic solutions.
- Comprehensive bureaucratisation of provision (as occurred in Sweden before the recent reforms) tends to insulate VOTEC from the dynamic forces of global and local labour markets and may lead to a mismatch between skill formation and emerging market demands.
- An unregulated free-market approach seems to engender an undersupply of vocational and technical skills, as is evident in the United Kingdom and the United States. In both these countries, individual returns to vocational qualifications are perceived to be low. In addition, British and American firms tend to invest less in training than their German, Swedish or Australian counterparts and are more inclined to poach skilled workers from other firms than to risk their own resources.

VOTEC systems as trade-offs between stakeholders' interests

Decades of research – including classic studies by Eli Ginzberg and Ivar Berg in the United States – have shown that factors in the social and economic environment, and above all where people live, are more important determinants of their employment and their training prospects than are their individual traits. For this reason successful training policies must be engineered in a way which is consistent with and not contrary to other urban planning and social policies. What this implies is that the levers of change must be operated at many different points in the social environment, for example:

- on qualifications, through creating national systems to promote reliability, validity and portability of competence-based certificates, with progression and bridging;
- on taxation, to create incentives to individuals to invest in skill formation;
- on wage systems, fostering increased individual investment in training by providing skill-based wage differentials;
- on employment, by passing laws to influence training contracts, recruitment, promotion and training practices;
- on school-level and post-compulsory education, by stimulating greater responsiveness to industrial needs and complementarity with work-based learning.

Even if each country's system could be re-cut from whole cloth, there is no convincing evidence on whether to prefer a concurrent pattern of organising initial VOTEC over a sequential pattern. The best pattern is that which works best in a particular context. However a model is constructed, major countries can be fitted into a revealingly large number of combinations.

For example, an inquiry into initial VOTEC in the construction sector in Germany, Italy, the United Kingdom, and France, an investigation conducted by the French research centre CEREQ, led to the identification of three types of relationships between labour market mechanisms and education systems (CEREQ, 1990). These three types of relationship can be represented as three models:

i) the market-led industry-based model, in which training is tightly geared to short-term labour market shifts;
ii) the training-led school-based model; and
iii) the training-led industry-based model.

In the latter two models, school-based and industry-based providers attempt to anticipate future demands for labour in particular fields and adjust the supply of school-based or work-based training places accordingly. Such a typology can be generalised, in a rough way, and used for other countries (below) simply to illustrate the ways to which OECD countries inter-link schools, labour markets and firms:

Labour market and education relationships in the VOTEC system

Market-led Industry-based	Training-led School-based	Training-led Industry-based
Italy	France	Germany
United Kingdom	Belgium	Switzerland
United States	Sweden	Austria
Australia*	Denmark	
	Netherlands	
	Japan	

* From 1990 on, Australia is in transition towards a training-led model which combines school-based and industry-based components. See discussion below.

The interlinkages suggested in the table above are the result of elaborate historical trade-offs between the major stakeholders. These stakeholders include governments at central and regional levels, the labour, economic development and education administrations within government, unions, employers, teachers, and, last but not least, electors, taxpayers, and young people. Since the stakeholders characteristically have different objectives, different values, and different time horizons, it matters a great deal, for the individual within a system, just where the trade-off has been struck.

One example of the significance of the precise trade-off between stakeholders is the role of teachers and curriculum developers in the VOTEC system. In countries which conform more or less to the market-led, industry-based model, training is so dependent on the labour market and on employers that it is only loosely institutionalised. Institutions and the teachers within them are cast in a secondary role. It is difficult for vocational educators to initiate new forms of training in response to technological change unless the initiative first comes from industry. Indeed, the education and training system has difficulty absorbing technological change because it often threatens demarcation lines between trades.

In Australia, the commonwealth government became so acutely aware of the damaging consequences of this dynamic that it initiated a series of radical reforms leading to a major restructuring of the award system. Conducted in collaboration with the unions, award restructuring involved broad-banding a range of hitherto separate occupational classifications. For example, certain strands of electronics and mechanical engineering have been integrated into what the Australians call "mechatronics." The government recognised that Australia was ill-served by a system of apprenticeships where the levels of demand were driven by the number of places available in relevant industries and where the content of the courses reflected outmoded occupational categories.

Pressure points that drive change

Trade-offs between contradictory objectives tend to be inherently unstable. Periodic alterations are needed to resolve tensions caused by a shift in the balance of forces among the stakeholders. Indeed, alterations of this kind may be as common as the alterations due to external circumstances which change a country's place in the world. Since all countries have to live with these shifting trade-offs and policy reintegrations the difficult trick is to ensure that the tensions become creative rather than destructive.

Any system as embedded in its environment as initial VOTEC is bound to change continuously in some respects. The management of this change has to be multifaceted. It seems to require the same kind of process as the successful management of strategic change in eight well-known British companies studied by the University of Warwick Business School's Centre for Corporate Strategy and Change (Pettigrew and Whip, 1991). The requirements appear to be a combination of *i)* pulling several policy levers in coherent combinations, and *ii)* appropriate institutional conditioning, *i.e.* creating the conditions necessary for the levers to work effectively.

The widespread nature of French reforms in the 1980s, and more recently of reforms in Australia and Sweden, suggests that governments are taking the view that pressure

should be applied at several points simultaneously, although some changes are certainly prerequisites for others and therefore require a particular ordering. In Sweden, the central government began the process of disembedding parts of its VOTEC system and creating a more competitive and market-driven system before it was prepared to accept the logic of the widening earnings differentials at plant level. Later, it announced drastic reductions in direct taxation which would deliberately widen disposable income differentials. In Australia, the commonwealth government acknowledged that a nation-wide vocational accreditation system was a prerequisite for a competence-based system of wage awards. The government combined both of these with the introduction of a Training Guarantee which lifted the volume of skill formation effort and increased its quality and its relevance to emerging industrial needs. Without this combination of changes, industrial restructuring would never have worked.

What may be needed is a simultaneous engineering approach to the management of initial VOTEC in its environment. In advanced manufacturing firms, production and training are being combined into almost inseparable activities. Here is one description of the process:

> "Product life cycles become shorter and shorter. Hence product development and marketing have to be speeded up. This leads to simultaneous engineering. The conceiver of the product is the salesman and vice versa. Education is built-in into all 'stages' of the value-added chain of companies. The customer-orientation is much stronger. The 'market' is omnipresent" (Clement *et al.*, 1993, p. 99).

The implications of such an approach for the reform of initial VOTEC are that:

- when training parallels production there is little or no lead time;
- if the individual employee's learning curve has to be shortened and steepened as much as possible, he or she must be already trainable;
- extensive initial preparation in trainability, therefore, becomes a key outcome of initial VOTEC;
- to the extent that a country's industrial policy successfully assists the development of advanced manufacturing, this will increase the demand for generic trainability over specific skills;
- anticipatory needs analysis as the traditional tool for planning educational provision is de-emphasised;
- simultaneous engineering suggests the need for a growing integration of many corporate functions – marketing, design, manufacture, personnel, and work organisation.

One of the reasons for suspecting that the simultaneous engineering approach is on the rise is the concurrent and massive growth in demand for soft skills over very many sectors in industrialised economies. These "soft skills" are necessary for design, marketing, software engineering and customer service. They are now becoming more heavily used in manufacturing firms than ever before, and not just in computer hardware and hi-tech industries. Shop floor jobs in industry after industry are becoming more like computer-related service sector jobs.

Efficient manufacturing is driven by soft skills as well as new technology, and some manufacturing firms are earning a big fraction of their income from selling services

associated with their products, including training. Indeed, they find that it is their associated services which can give them their competitive edge. Until recently, no more than a quarter or so of employees in the manufacturing sector were engaged in services such as staffing the office, maintaining the distribution network, and so forth. As that fraction becomes larger, the way manufacturers recruit, train and reward staff is bound to change. Soft and hard skills have to be intermingled, and again it is trainability which is the core quality.

So pressure points need to be identified and exploited as part of a coherent strategy of change which helps young people to acquire the competences appropriate to the emerging needs of modern economies, rather than the needs of disappearing ones. These pressure points exist throughout the industrial structure, employment and education systems. They can be addressed *i)* occupationally, *ii)* by industry sector or *iii)* locally.

Some countries – for example, Germany – rely heavily on pressure points in the labour market, which is heavily structured and regulated occupationally, with agreed requirements, including skill and training standards, and very strong incentives to promote employer supply of and young people's demand for training places. Other countries, like Australia or the Netherlands, make considerable use of industry sector collective bargaining as a springboard for agreements on competence standards or training arrangements. Indeed, by 1984 in the Netherlands, 29 out of 38 sectoral agreements had been negotiated for training which is financed by a tax ranging up to 1.5 per cent of payroll. This system is reinforced by subsidies to each fund's apprentice training from the Ministry of Social Affairs and Employment (Kraayvnager *et al.*, 1989, pp. 30-31).

Many countries have realised the advantages of local institutionalisation of stakeholder interests. Eight of the twelve members of the European Union have systems of compulsory chambers for employers. In countries like Austria and Germany, these chambers form part of a strong corporatist structure. Local government, union and employer representatives negotiate local training arrangements and regulate interactions between publicly-financed education institutions and company-based initial training.

The role of government: coherence, complementarity and comprehensiveness

There is a discernible trend among the twelve members of the European Union, and outside it in countries like Sweden, towards a "federal" principle of governance, analogous to that built into the constitutions of the United States and Australia. This is consistent with a tendency to limit the role of the highest level of government to the setting of frameworks and standards for the principal actors in the country's social and economic life. It is also consistent with a tendency to limit top-down interventions so as to maximise policy actions which are better done at a lower level. Quite possibly, this means that central governments, in concentrating on a framework of incentives and constraints, will encourage *i)* flexibility of response to change among the actors, especially by exploiting the co-ordinating potential of markets; and *ii)* more accurate identification of individual or corporate skill needs than is feasible through monolithic political structures and highly bureaucratised training provision.

Many of the decisions which influence the effectiveness of initial VOTEC are taken in the workplace, in government offices, and in the household. These decision-making domains can be influenced by public policy – on industrial development, employment, company or tax law – but those external influences are likely to be greatest where they work "with the grain". For example, policies are more influential if they can be engineered to support rather than contradict business strategies, or to mold and reinforce household preferences. Above all, they are likely to be more effective when they reinforce each other by operating on different pressure points while converging on similar objectives. This is what comprehensiveness means: the deliberate effort to use all possible contextual policies to support key training policies.

As was recently pointed out, Australia is probably one of the best examples of a co-ordinated multiple-pressure-point strategy (Clement *et al.*, 1993). In effect, six strategies are being implemented simultaneously:

i) the Training Guarantee is designed to ensure that all but the smallest enterprises provide a minimum level of training;
ii) by making training universal, the Guarantee will also reduce firm's fears that their skilled workers will be poached by others;
iii) the responsiveness of the Technical and Further Education colleges to industrial needs is being increased;
iv) award restructuring is increasing the incentives for individuals to invest in training;
v) industrial restructuring and the broad-banding of occupations means that better-trained workers can exploit the productivity potential of new technologies; and
vi) the National Training Board is creating a national competences framework which will foster increased portability of skills.

If these projects come to fruition, the skill formation of young Australians will be greatly improved. But the immensely challenging nature of this task is also illustrated by Australia. The government recognises the great difficulty of achieving co-ordination. As all bureaucrats know, inter-departmental committees are very unwieldy, and the solution adopted to eliminating competition among the government's labour market and education and training policies was to amalgamate the former Department of Education and the Department of Employment and Industrial Relations into one mega-department knows as the Department of Employment, Education and Training (DEET).

There is another set of policies which have been developed with little or no thought to their interaction with the virtuous circle of policies described above, although they certainly do influence the requirements for VOTEC and the demand placed upon it. These are Australia's policies on technology, on the treatment of corporate physical capital formation, on individual expenditures on VOTEC, and on deregulation. What Australia has done has been well described as making public policy bureaucratically comprehensive. But there is an obvious absurdity in the logical conclusion of this approach, since it implies that the Treasury, Trade and Industry Departments will eventually be merged with DEET!

To achieve comprehensiveness it is necessary to pull the policy levers in a complementary way. It is also necessary to introduce policies which complement rather than

undermine each other. In well-ordered systems, with much attention to indirect policy effects on initial VOTEC, this is not always achieved. In general, rather too much attention is paid to Germany's dual system itself and not enough to related features of the country's industrial system and labour markets. The Germans have hypochondriacal debates about high costs and inflexibility as symptoms of sluggish corporatism. They naturally take somewhat for granted structural and cultural features of the country which create the conditions which allow the dual system to function. These are: *i)* consensual industrial relations, *ii)* a system of ownership and of corporate financing which encourages long-term planning and investment, *iii)* Close integration of local government with local employers and unions.

Australia and Germany provide examples of the methods and difficulties of achieving comprehension and complementarity between industrial relations, labour market policies and VOTEC policies. But there are other important areas for co-ordinated policy action which also deserve attention.

First, the provision of initial VOTEC only rarely figures in collective bargaining agreements. It is, unfortunately, a predisposition of some trade unions to minimise skill formation on the ground that it devalues the wages of union members. A chief preoccupation of some unions is to limit labour supply and therefore reduce labour market competition. It is also a predisposition of many employers to minimise training as an operational cost, preferring to "buy in" ready-made skills rather than to pay for skill formation themselves. In only in a minority of countries – such as Sweden, Denmark, the Netherlands, the German-speaking countries, and now in Australia – have the social partners so far overcome these predispositions that initial VOTEC is a major agenda item in collective bargaining. These countries have made more than average progress towards a mass system for providing young people with basic education and training. In such countries initial VOTEC achieves a centrality on union and employer agendas not to be found elsewhere.

A second area requiring co-ordinated policy action is tax law. In the United Kingdom, for instance, governments have systematically used tax concessions to favour expenditure on housing the fairly well-off and on providing cars for the even better-off (company cars). The billions of pounds of foregone tax revenue which these subsidies cost each year contributes to the expense of houses and cars in the United Kingdom. The taxman's favouritism for houses and cars is matched by hostility to individual expenditures on training, which are treated less favourably than in other countries.

Since government cannot possibly bear the whole burden of investing in the skills of young people, employers and individuals have to join the investment. Some countries force all employers to contribute directly. But in the end it is employer and individual motivation to invest which is the key to a successful mass system of initial VOTEC. To achieve sufficiently widespread motivation, elaborate incentive systems are essential.

The way that governments arrange ownership over skills and knowledge is for the effectiveness of the framing of initial VOTEC. The motivation of both employers and individuals to invest hinges on the value of and constraints upon the "ownership" of workers skills. Since the demise of slavery, employers' property rights in skills have been limited, temporary and paid for. Because the skills are embodied, the skilled person can

walk away. If employers can operate strong internal labour markets of the kind so common in the modern sector of the Japanese economy they can, in effect, take a share in the yield on an investment in young workers over many years. If employers train young people and lose them freely onto a vigorous external labour market, as in Germany, they may still find that their investment is worthwhile, provided the training system is sufficiently universal. German employers tend to compensate for losing newly-produced skilled workers by gaining others back quite easily.

In different ways in Germany and Japan, governments have arranged the labour market to protect the corporate yield on investment and thereby motivate firms to invest heavily in young people. Countries which have been less successful in providing such protection generally find that their employers have a weaker predisposition to train. Even when these employers are coerced, they often circumvent the coercion or limit their investment to what is unavoidable. For individuals likewise, it is the future return to their investment in education and training which is particularly important. In this context, the incentive effects of skill-based earnings differentials and security of employment can be significant.

Three different ways to skill young people

Several conditions are required in order to devise complementary policies, influence multiple actors to adopt a comprehensive approach, and to implement such policies in a coherent way. In particular, policy makers must identify those decisions which must be decentralised or devolved so as to place control in the hands of those who will be responsible for their implementation. Examples of this process at work can be drawn from three very productive but quite differently arranged systems for skill formation. The role of initial VOTEC is different in each case, but in each case there are some features of the collaboration between stakeholders which illustrate the kind of co-ordination which is necessary for effective initial VOTEC. Although the forms of co-ordination are idiosyncratic, all three illustrate the articulation of systemic solutions.

The first case involves subcontractors to large firms in Japanese manufacturing. Since 75 per cent of Japanese manufacturing employment is in small or medium size firms (compared to about 35 per cent in the United States) these subcontractors are a major site for initial vocational and technical training (Howard, 1990). This is especially so in a system like that in Japan where, after a long period of general education, initial VOTEC relies heavily on learning and production in the workplace. Since small businesses share of total employment has been increasing slowly throughout industrialised countries for almost twenty years, the small business is becoming a more and more important location for the work-based learning which is an essential ingredient of initial VOTEC.

These Japanese subcontractors enter into long-term collaborations with their customers. The vertically linked, decentralised networks of companies are the critical framework for a major set of workplace learning opportunities. The large firm-small firm relationship is not simply exploitative, nor is it one where the large firms are likely to cut out the small supplier at short notice. Instead, the large firms give strong technical support to

their smaller suppliers, even as far as including them in their simultaneous engineering of new products. Lesser security of employment, and wages up to 25 per cent below those of their big brothers, means that small firms tend to offer far more learning opportunities for new entrants to the labour force than the big firms.

By way of contrast, in 1989, Derzoutos and his colleagues identified the failure of American firms to know when and how to collaborate with other potential training providers as a major weakness (Derzoutos *et al.*, 1989). The key collaborations that need to be developed are those between *i)* the large assembly firms and their suppliers and *ii)* between the central government and its suppliers. In the long term, in-depth training of young people for manufacturing is seen to depend not on provision by the glamorous big firms but on inter-firm partnerships and government-small firm collaboration, since these are crucial to the health of the whole industrial sector.

The second case comes from Emilia-Romagna, which over the last twenty years has been transformed from one of the poorest to one of the richest regions in Italy. One factor in that transformation has been the competitive success of its 90 000 small manufacturing firms. Taken together, these account for 40 per cent of the region's total employment (Howard, 1990, p. 96). Horizontal networks among these small firms are able to produce high-tech products which are competitive on the world market. One of the reasons why this intricately co-ordinated system works is because of a three-way alliance between trade associations, unions, and the regional government, which is responsible for training and economic development in the region.

Capecchi (1989*b*) argued that immediately after the Second World War, Emilia-Romagna's government was out of step with Italy's central government. The Italian government focused its post-war redevelopment efforts in the industrial north, creating Taylorist enterprises in Piedmont and Lombardy. Starved of Marshall Plan funds, Emilia-Romagna's government declared its support for small-scale entrepreneurship and established a vast horizontal network of small companies. It did this in a variety of ways:

- it facilitated the creation of a credit structure geared to the financing of small firms;
- it allowed small craft firms to remain outside the formal economy during their incubation period. Only once they were established were small firms expected to comply with the full range of labour and financial regulations;
- it learned how to make good use of any funds available from the central government or the European Community, but the result was that, "a network of entrepreneurial skills grew out of an awareness of being politically at odds with the central government" (Capecchi, 1989*a*, p. 255).

Broad-banded skills are at a premium in the small firms of Emilia-Romagna. Despite the backwardness of much of the state educational system, stable regional policies supported by the trade associations led to a co-ordination between technology transfer and other industrial development, and the outcomes have been notably successful. Capecchi identified serious inadequacies in both the school system and in institutionalised vocational training provision for young people as one of the major barriers they have faced. But he also identified as valuable, the opportunities the regional government's

special schemes offered in helping young people wishing to set up in business and in establishing job-creation projects for young people.

Emilia-Romagna exemplifies a social and economic context which has been favourably conditioned – by design and by historical accident – to breed young people who are strongly oriented towards multi-skilling and towards individual enterprise. Capecchi characterises these young people as "small entrepreneurs without a firm". Typically, they are young people with at least high school education who want to work for themselves. If the effectiveness of complementary policies depends on the success of these policies as motivators, then there is evidence here of the formative role of family and social values which have been sponsored and reinforced over two or three decades by regional government and the social partners.

Italy in general is one of those countries where learning opportunities for young people depend heavily on workplace learning rather than educational institutions. So the development of a thriving economy of small firms with immense incentives to multi-skilling and enterprise is as important to young people's fate as a new formal, qualification-driven programme might be in countries like France or Sweden where initial VOTEC is more institutionalised.

The third case is Germany, where small firms again play a crucial role in providing learning opportunities for the mass of young people. This is achieved in a way which is quite different from either Japan or Italy. It is done through intense central government intervention in employment so that no young person below age 18 is likely to be employed unless he or she is offered a specified traineeship. No firm may employ such apprentices without having a *Meister* to supervise. The *Meister* must have been trained as a trainer. The holder of an apprentice certificate (*Facharbeiterbrief*) has to be treated in a certain way by employers and even by the state. When an apprentice becomes unemployed, he or she receives better treatment than to unskilled unemployed workers.

The extent to which German labour law mandates the treatment of workers, their training, and sector-wide collective bargaining is sometimes difficult for non-Germans to comprehend. This strong legal framework for employer behaviour is matched by an equally strong regional structure of initial VOTEC provision negotiated and articulated by the state government and social partners, and monitored by federal institutions. A sectoral approach at regional level is one of the keys to effectiveness. The result is an occupational labour market with a massive pool of skilled labour. Small firms contribute even more to this than do large firms because corporate cost-benefit analysis favours their participation. In its most competitive sectors, like machine tools and chemicals, the small and medium-sized firms account for most of the output and most of the learning opportunities within the dual system. The usual gap between wages and working conditions in small and large firms is much smaller in Germany than in most countries, and government and social partners between them have ensured the collectivisation of training costs, largely through the labour market.

This powerful framing of both employers' and young people's decisions is driven not only by mandatory provisions but also by powerful incentives, above all by incentives to young people to invest in their own skills. On one estimate, the young trainees of the dual system bear about 35 per cent of all training costs, against 53 per cent by firms, 2 per

cent by the federal government and 10 per cent by the *Länder* (Grünewald, 1984). The 70 per cent of each age group who go through the dual system do so not only because they know that they cannot afford to be without the *Facharbeiterbrief*, but also because the healthy earnings differentials and further job options of the *Facharbeiter* over the less skilled constitute a good yield on that considerable private investment.

Learning opportunities for individuals

It sometimes seems as if the individual young person is no more than the dependent variable in an equation where the independent variables are all the other stakeholders, not least those powerful abstractions, government and the social partners. The individual is heavily constrained by the actions of other stakeholders. But the individual is nevertheless the fulcrum of all change. It is he or she who has to be motivated. All VOTEC systems suffer from supply problems, from rigidities, poor progression within or between routes, educational institutions unresponsive to individual needs or to industrial needs, employers reluctant to engage in a fruitful long-term partnership with those institutions. But, even if supply-side problems can be reduced, the effectiveness of any system still turns on individual demand, on the strength of the individual's motivation to learn and willingness to invest time and effort.

There is a growing recognition that the multiple partnerships which control VOTEC learning opportunities have to look beyond the acquisition of narrow and specific skills, because these often lead to dead-end work. It has to look at initial VOTEC as the foundation for recurrent learning. This springs from two realisations. The first is the recognition by a growing number of employers that it is necessary to structure work and employment practices so that a working career includes a learning progression which provides the basis for a rising productivity curve. Second is the realisation that the acquisition of job-specific skills has to be accompanied by the acquisition of the generic skills needed both to maximise productivity and to ensure easier transfers from job to job.

These are supra-technical skills such as analytical and planning skills, movement between concrete and abstract thinking, logical thinking, creativity, aptitude for teamwork, persistence, concentration, accuracy and conscientiousness (Hayes, 1981). If individuals do not possess such personal qualities, flexible manufacturing and highly productive forms of work organisation cannot be achieved. The lesson from success stories is that certain business strategies, with intelligent support from government and social partners, do create conditions which promote such qualities as well as job-specific skills. Success depends upon appropriate conditioning as well as policies which are comprehensive, complementary and coherently implemented.

4. Conclusions

There is nowadays very little support for the over-arching schemes of the early 1980s, such as the proposal that education vouchers represented an idea of universal merit and applicability. Now, the accepted principle is that effective prescriptions for initial

VOTEC must be country-specific. They must be embedded in a nation's culture and institutions. Motivating individuals and employers will be done very differently in Italy, Japan, Sweden or the United States. More than that, there is increasing evidence that in some countries – such as Italy, Germany or the United States – a large part of the solution has to be regionally specific.

A robust and comprehensive framework of actions and incentives is essential if initial VOTEC is to be provided for the mass of young people. Synchronised changes must be engineered over many policy fields. Some of the policy areas that need to be considered in the context of initial VOTEC, such as company financing, technology transfer or trade policy, are so unobtrusive and indirect in their relationship to it that they are not regarded in any way as training and education policies. This is a difficult challenge for policy makers, since VOTEC responsibilities are traditionally identified with only one or two ministries. To introduce into government policy making and practice the degree of operational integration characteristic of simultaneous engineering really is a challenge.

Governments and markets must function together rather than alone. Public interventions covering a wide range of pressure points, including both labour markets and industrial structure, can be managed in order to regulate rather than displace market forces. The visible hand of government is as necessary as the invisible hand of the market to ensure that long-term objectives are pursued as well as short-term ones, and to ensure that market failure is either prevented or compensated for.

The information and incentive functions of training markets are a prime feature of any successful system for initial VOTEC. They are the key to its sensitivity to scarcities and to emerging industrial needs. Countries which are engaged in system-wide overhaul, like Australia or Sweden, are not abdicating the role of central government. They are seeking appropriate ways to enhance the sensitivity of government intervention while ensuring a capacity to provide for the long-term skill needs of the labour force.

The ever-increasing globalization of competition drives OECD economies towards restructuring of any major system for human resource development which is characterised by inertia or insensitivity to market forces. Many governments now recognise that without much more comprehensive policy approaches and harmonised practices their emergency interventions to help high-risk groups offer nothing more than temporary and shallow relief. More seriously still, systemic failure will continue to produce serious underachievement by large fractions of all their young people. The need for greater competitiveness and productivity, and for a broadly skilled and flexible workforce translates into a need for homegrown systemic solutions in order to produce enough skilled and well-motivated young workers for employment or self-employment. Patching and bandaging around the margins of a seriously deficient VOTEC system will no longer suffice. Countries can no longer afford to leave a third or a half of their young people largely unskilled and certainly inappropriately skilled, even if they can get jobs of some kind.

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Chapter 8

LINKAGES: A NEW VISION FOR VOCATIONAL AND TECHNICAL EDUCATION

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The Phoenix seminar on vocational and technical education was a rewarding experience for its participants. Discussion, rich and lively throughout the proceedings, was sustained by the intrinsic importance of the topic, the high quality of the contributions, and the variety of viewpoints brought to bear on the topic. This synthesis cannot do justice to the wealth of material and ideas generated at the seminar, but it is an attempt to capture the flavour of the discussion, and to reflect on the issues that emerged. It is also intended to complement the previous chapters, which are themselves extensions of presentations and discussions held during the seminar.

The agenda and the setting

The purpose of the seminar was not to arrive at a set of conclusions or direct recommendations concerning policies for the future development of vocational and technical education and training, even though the policy orientation was present throughout the discussions. Rather, it was an exercise in clarification and exchange, drawing on the collective but varied experience of OECD members on the major issues, including their political and theoretical underpinnings.

"Linkages", the central theme of the seminar, proved to be a useful operational concept for characterising the complex array of VOTEC problems and possible solutions. As noted in the introduction to this volume, the linkages theme was explored from four different perspectives, each backed by an expert's analytical report. These perspectives can be summed up as follows:

- The structures of provision: the pathways perspective.
- Learning strategies: the learning to know and learning to do perspective.

- Trade unions and employer roles: the social partners perspective.
- Policy co-ordination: the integration perspective.

Each of these perspectives was discussed separately, and for the most part, seminar participants accepted the papers' analyses and conclusions. Participants made a number of suggestions to the authors about gaps or points that needed to be further developed. Some argued that the role of trade unions in the social partners perspective was not adequately covered and did not match the detailed discussion of the role of employers.

Participants also identified the importance of thinking about the interrelationships *among* the four perspectives, particularly between the pathways and the learning-by-doing perspectives, and between the social partners and governmental co-ordination perspectives. Many of the issues raised in the discussion were seen to cut across all four perspectives and could not meaningfully be considered in isolation.

Participants recognised from the outset that linkages could not be discussed separately from the broader problem of VOTEC policies. It was therefore not surprising that much of the discussion at the seminar revolved around the central issue of the design and implementation of overall policies to improve the status and effectiveness of VOTEC. This discussion raised quite basic questions about the very concept of "policy". Policy instruments and manifestations differ from one national setting to another. These differences were particularly evident in federally constituted countries versus those nations with more unitary forms of government. The contrast was also apparent with respect to those countries with a strong tradition of decentralised systems of policy making and administration, and those where these functions remain the attribute of central government. In VOTEC, as in all other areas of education and training policy, differences in the nature of policy making have been a perennial problem in international exchange and understanding.

Finally, these difficulties of understanding differences in policy making tended to be compounded by differences in the use of language and terminology, particularly between the US and European countries. In the American context, "vocational" and "technical", as reflected in the title of the seminar itself, were used more as interchangeable terms, spreading throughout the entire spectrum of educational institutions reaching into colleges and universities. In European countries they have more distinct connotations, "vocational" referring to the preparation of semi-skilled and skilled workers and "technical" covering middle level (and higher) technicians. These differences were not explicitly discussed during the seminar, and participants opted to apply their own interpretation according to their national traditions. Communication among participants was, however, facilitated by the fact that the majority represented the interests of the vocational and technical sector.

While the dominance of participants at the seminar from the vocational sector encouraged some of the participants to speak out against the shortcomings of the general education sector, voices were also raised against denigrating any one sector. These individuals stressed the importance of common progress among all sectors, and of the need for forging closer links among them. A larger contingent of general education

experts among vocational and technical specialists in this kind of discussion would provide a useful stimulus for an even more provocative debate.

The unanimity in the VOTEC community regarding the desirability of linkages is striking. This is understandable, given the almost universal need across the OECD for greater permeability of educational streams as a means of attenuating the traditional dichotomy between general academic education and VOTEC education. It is equally understandable that many countries have pursued a more holistic approach to the pedagogy of learning, in which "learning by doing" is given its place along with cognitive processes of learning. This development has laid to rest the myth that education is a matter for the head, and training for the hands. But questions do arise when it comes to business-education linkages and partnerships – questions about the intensity and motivation of the relationships, and about curricular control. The challenge raised in the OECD secretariat presentation – "Linkages: Trap or Bridge?" – was picked up, in particular in the discussion of the diversification of educational pathways. The danger that such linkages might lead to a take-over of education by industry was strongly underlined by many participants, particularly participants not from the United States.

The links between business and education featured prominently throughout the discussion, very much influenced by the US setting of the seminar, and the local context of Maricopa Community Colleges. The latter provided eloquent examples of education-business links, imaginatively conceived and well funded. The educational programmes were designed to ensure that the colleges play their full part in the local economy and cater to the employment needs of different age groups of the population, both adults and young people. The Maricopa setting also exemplified the commitment to providing education and training opportunities to the disadvantaged.

The Maricopa College initiatives are in line with the dynamic new emphasis at the federal level on VOTEC education, including the tech prep initiative to connect VOTEC in the last two years of high school with the first two years of post-secondary education, and the efforts to link training to welfare programmes. Of similar significance is the American commitment, now embodied in statute, to the integration of academic and vocational aspects in public education.

A new vision for VOTEC

The seminar was left in no doubt that these new initiatives at federal level must be seen against the background of the sense of strong dissatisfaction with educational standards prevailing in the US. This feeling was most forcefully aired at the seminar by representatives of the US business sector. It carried the clear implication that forward movement could be difficult, given the entrenched positions of the education system itself. What was needed, therefore, was a new and broader VOTEC vision, and its improved status. The elevated status would then provide some of the impetus for overall educational improvement.

This view, that a dynamic VOTEC system would also serve as a catalyst for improving the overall quality and relevance of education, was widely shared among

participants. Status is not something that can be decreed: it can only be achieved if the necessary conditions for high-quality VOTEC are present, not only within the education system, but also, and more particularly, in industry itself.

In line with the essentially economic role of VOTEC, the economic changes going on in OECD countries have created a new imperative for VOTEC reform. The main ingredients of this imperative were readily recognised and accepted as applicable to all countries: the accelerated pace of technological change, accompanied by economic restructuring (often with painful social consequences), and compounded by changes in labour markets, jobs, skills requirements, and demographic trends. We have also observed growing economic interdependence among countries, placing a premium on their competitiveness with the quality of their human resources becoming paramount.

These changes present a formidable set of challenges for a revamped system of VOTEC. Following a general challenge to occupations remaining the basis for determining the organisation of VOTEC, seminar participants devoted considerable attention to the way in which occupational structures are evolving. On the one hand, they remained perplexed by the uncertainties inherent in forecasting the precise nature of this evolution, and the resulting difficulties in relying on occupations as a basis for organising education and training provision. On the other hand, participants recognised, and often stressed, that occupations do play an important pedagogical role in facilitating young people's personal development by fostering identification with clearly perceived roles in adult and working life. The discussion made it clear, however, that more attention had to be given to the preponderant role which the service sector and service activities are coming to occupy in the economy, reinforcing the spread of an employee culture in our societies, and to the fact that employees now at all levels deal increasingly with people and information rather than things. The implications of this trend for VOTEC require further exploration, particularly the extent to which existing apprenticeship systems can respond to these new developments.

Social concerns featured prominently in the discussions, side-by-side with economic ones. The two were seen to be closely related, with the accent on the role that VOTEC could play in drawing more people into the mainstream of social and economic life and preventing disadvantaged groups from being marginalised. In fact, the problems of the disadvantaged received considerable attention at the seminar. The distinction was made between micro measures, often referred to as "fire-fighting", which address the problems of specific groups or regions, and more macro measures, reflecting policy stances towards social equity in a broader sense.

Most of the examples given at the seminar were of the micro type, including some of those demonstrated in the site visits around Phoenix. These local examples were thriving under dedicated leadership, and seemed highly effective in their education-business-welfare links. It was difficult, however, to see how they could be generalised and provide a framework for continuous social and economic integration. Macro policies were dealt with mainly in terms of concepts and strategies rather than empirical demonstrations, apart from some of the US examples and, of course, the well-established dual systems in Europe. One additional and eloquent exception was that of the comprehensive policy recently put in motion in Australia, a development which attracted considerable interest

among seminar participants. In its comprehensiveness and scale, it made the absence of serious attempts at coherent policies in other countries quite glaring.

The seminar did, however, fully recognise, and benefit from, the differences among countries in their approach to VOTEC. These differences are related to national traditions, industrial structures, and political and social philosophies. In particular, participants were aware that national systems of education, and of VOTEC more specifically, can be seen at one extreme as serving the purpose of consolidating existing social structures, or at the other, encouraging social mobility and restructuring. Most systems are probably operating between these two extremes, but this helps to reinforce the point repeatedly made during the discussion, that no one system, however attractive it may seem within its own national context, can serve as a model to be replicated elsewhere.

As already noted, it is extremely difficult to separate the discussion on linkages from the general considerations about VOTEC education. It is nevertheless possible to identify several themes that cut across the four linkage themes on the seminar agenda. These items are: educational structures and learning strategies; the training of young people and adults in the labour force; comprehensive policies for skill formation.

Educational structures and learning strategies

This theme was central to the whole discussion, which was quite natural, given that school-age young people were the primary age group of interest. The main concern was how to improve the effectiveness of VOTEC and thereby enhance its status. To achieve this improvement, the guiding question was how to facilitate individual choice as young people move through the maze of options, toward clearly discernible and equally worthwhile destinations: further studies or employment. The question remained open as to whether this could be best facilitated through a more diversified system of options, or through a more consolidated set of offerings.

Seminar participants recognised that individual choices are necessarily determined by the dominant institutional model catering to the needs of the bulk of the 15/16- to 18/19-year-olds in a given country. At the risk of oversimplifying, three such models could be distinguished across OECD countries:

- *the schooling model*, as it exists in North America, Japan and Sweden, in which the vast majority of young people remain within the formal secondary or high school until 18, following general study programmes within which a number of options are available;
- *the dual model*, as it applies in Germany, Austria and Switzerland, for example, in which the majority of students are channelled at a fairly early stage into apprenticeships, enterprise-based but also involving prescribed attendance at schools as an integral part of the training;
- *the mixed or pluralistic model*, as is the case in such countries as France, Italy, the Netherlands and the United Kingdom, with a variety of institutional provision beyond compulsory schooling, offered within schools themselves, within enterprise or training agencies, or combinations thereof.

Unsurprisingly, it was the dual model which attracted most attention, and temptation for emulation, because of its apparent organisational clarity, and its association with the economic and employment success of the countries within which it operates. It was the one that was less prone to change in its basic structure and articulation, though its proponents did recognise that it was not without its problems, and that the economic downturn of the early 1990s is testing its sustainability. Problems with the dual model arose from the impact of changes in occupational structures, resulting in particular from the growth of the service sector, from the increased knowledge component now required in all jobs, and from changes in the social demand for education and training. Seminar participants also noted that the success of such a model depends heavily on the availability of a type of enterprise organisation characterised by clearly defined roles for trainers and a clearly defined set of arrangements for the provision of training, which again may be particular to the countries within which it operates.

It was not the intention at the seminar to discuss the relative merits of the different models in question but rather to see what they needed in common in their efforts at improvement. In all these cases, the main instruments for effecting such improvements were seen to be: *i)* changes in the curriculum and in training regulations; *ii)* reorganisation of teaching and learning. Though neither was discussed in great detail, a number of common trends and desiderata emerged pointing to directions of change.

a) *Curricula*

A serious problem seen here was the need to arrive at a better balance between what is "general" and what is "vocational", with reciprocal components added to each sector. In addition to satisfying epistemological requirements, this type of integration would help enhance the status of vocational and technical programmes, and give those participating in them better possibilities for transition to higher education studies and, more generally, for successful participation in further education and training. As a consequence, policies and procedures for access and admission to higher education institutions will need to be reviewed, thus building up a continuum throughout the system for all categories of students. Coupled with the higher employment potential of vocational and technical programmes, these developments could eventually lead to greater parity of status and prestige between general and vocational/technical education. The process is similar to what has already reached fruition within higher education itself, between the university and the non-university sectors, in a number of countries.

The redefinition of curricula can no longer be left to the sole initiative or responsibility of schools and the educational sector. It has to involve dialogue with representatives of the world of work, both employers and employees, as well as with employment and training agencies. Appropriate mechanisms will need to be set up, or reinforced where they already exist. The objective would be to institutionalise the process of curriculum renegotiation so as to improve its balance and relevance, while avoiding the risk that its core, long-term educational purposes, become vitiated by the need to respond to transitory or locally-defined requirements. For individual as well as broader national reasons, the quest for relevance must not be allowed to lead to situations where the curriculum is

dictated by the local economy – a danger which was felt to be particularly real in the context of increased decentralisation of educational decision making.

b) *Teaching and learning*

Solutions to many of the problems discussed above were seen to be dependent on the capacity to introduce changes in the approach to teaching and learning itself. Two broad considerations guided the discussion. Firstly, the period of basic preparation, on which subsequent job-specific skills can be built, is becoming both more intense and increasingly extended, reaching beyond basic schooling and into higher education itself. This raises questions about the timing of the introduction of vocationally specific skills within the educational continuum. It was generally accepted that this is not a function of basic schooling and that when it does become appropriate, it can be done best in conjunction with the workplace. In addition, the educational role of vocational programmes and courses needs to be improved as a contribution to this extended basic preparation. There is clearly a need for greater convergence of theoretical and practical learning throughout the educational experience of all young people.

Secondly, there can be no progress unless teachers and trainers are induced to become its spearheads – hence the crucial role of teacher training, but also that of trainers. In the case of teachers, a greater opening up to the world of work is necessary. They must change their approach to teaching by placing greater emphasis on empirical learning – learning by doing – drawing on lessons learned from the workplace. Trainers need to develop a capacity for the introduction of abstract concepts into vocationally based learning, a change necessitated by the growing information and knowledge components of all jobs. In many countries, this would imply improvements to the status of training and of its support systems, as a function of the enterprise. In this way, teaching and training, though they can never be fully assimilated, can get closer to each other, and new, more exciting, learning situations can be created for both teachers and trainers and their pupils. Seminar participants shared the belief that movement in this direction was particularly important in dealing with the problems of disadvantaged groups, those who remain unmotivated, and those who drop out prematurely, calling for an imaginative mix of education and work-experience programmes.

The training of young people and adults in the labour force

The previous section dealt with a category of VOTEC questions directed at young school age people preparing to enter active life. It was natural, in this case, that the educational component should dominate and that VOTEC initiatives should be seen as essentially school-based. It was equally natural, when it came to people in the labour force, that the training dimension should be given prominence and be seen as fundamentally employment-based. This is in line with the generally accepted notion that the workplace provides the environment within which training in specific job-related skills can be best obtained and that enterprises themselves have their own strategies for the development of their human resources as part of their overall investment strategies. Such enterprise-based human resource development strategies acquire additional significance

in times of labour shortages, due to smaller youth cohorts coming into the labour force, and the rapid obsolescence of skills brought about by technological change. Training then becomes an essential component of enterprise policies in sustaining their competitiveness in the market.

However, not all adults are in the workforce, nor are all those who are in the workforce equally amenable, or adequately prepared, to receive training. Moreover, not all firms are sufficiently equipped, or have the skills and capacity to undertake the required training themselves. These facts throw into sharper relief the necessary links between enterprise training, the education system and its institutions, and government policy more generally. These links operate differently according to the different target groups concerned.

Three such target groups can be identified. The first group consists of those who have been by-passed by the education system and, therefore, need remedial education to acquire a foundation of basic literacy and numeracy skills. In many European countries, this group is, for the most part, made up of traditional migrants from developing countries, who have not been well served by these countries' education systems. The situation is different in the United States, where remedial education for literacy deficient adults is an important function of community colleges, which offer open access.

The second, and largest, group consists of young people and adults in the workforce. In this case, primary responsibility for their training lies with the enterprises. In discharging this responsibility, enterprises often establish links with educational institutions in the reciprocal use of personnel and facilities, organised mainly in the locality within which both operate. In this way, direct links are established between education and the local economy, as participants saw during the site visits to the Maricopa College System. The extent to which such links may lead to undesirable educational effects or distortion, was a matter which was repeatedly raised in the discussion. Small and medium-sized firms do not have the training capacity of larger ones, and this may result in an uneven distribution of training across the total workforce. Thus, there is a role for governments in providing adequate incentives to ensure not only an adequate level of involvement in enterprise-based training, but also its equitable distribution among different categories of firms.

The third category consists of the unemployed, or those at risk of becoming unemployed. Here the main responsibility lies with governments, working through its employment and training agencies, in close co-operation with both firms and educational institutions, as part of overall labour market policies. An essential challenge to such policies has always been how to design schemes for a more constructive use of unemployment benefits, with efforts increasingly directed at associating such benefits with the provision of training opportunities for the unemployed. Taken together with the general responsibility of governments in sustaining the overall level of skill formation, and appropriate investment therein, this development opens up vast new vistas in the development of training markets. There was only peremptory discussion of training markets, focusing on the usual parameters of who pays, who benefits and who controls. These issues were seen as relevant, but beyond the scope of the Phoenix seminar.

One essential component of training markets did generate considerable discussion: credentialling. It was recognised that this was part of industrial relations and tripartite

agreements, the objective being to ensure the transparency of qualifications, wherever they may have been acquired. At present, credentialling is heavily influenced by educationally derived practices and standards, which may not always be appropriate to the assessment of competences and qualifications deriving from the work environment. Though academic credentialling cannot be minimised or ignored, nations should work towards developing systems in which such credentialling could be matched by industry-based credentialling. The ultimate objective would be to develop a common currency of internationally oriented qualifications combining the two types. A number of participants felt that this was an area in which the OECD could take the lead and that the present time was particularly opportune for such an initiative, at least in terms of an exploratory investigation. It was equally felt, though not discussed in detail, that the whole question of the approach to adult learning and its pedagogical underpinnings needed closer attention. Very often the methods used were a mere replica of those applicable to children and young people. Such an approach may not be appropriate to the interests, motivations and learning styles of adults. Conversely, in a system of continuous learning there would be clear need to rethink at least some of the learning processes and curricula in initial education and training.

Comprehensive policies for skill formation

In a sense, this theme pulls together the various policy strands deriving from the whole discussion. The argument for establishing comprehensive policies for skill formation was fully presented in Keith Drake's paper, and complemented by Mari Sako's presentation on the role of employers and trade unions. It is difficult to summarise the richness of the discussion to which these presentations gave rise, but four issues can be singled out for comment.

a) *The links to other policies*

It was easily recognised that policies for skill formation extended well beyond training policies as such. In fact, training policies very much depend on policies concerned with the industrial structure of a country, especially the laws and policies governing wages and employment. Such policies have to be country specific and will, in particular, be influenced by the political philosophy prevailing in individual countries. There is a sharp contrast between countries which adhere to the principle of full employment and those where employment levels are allowed to fluctuate according to the whims of market forces. It was also recognised that, in many countries, training and related non-training policies have to have a very strong regional dimension and take account of regional particularities of industrial structures, values, and needs. In all cases, the objective of policies in this broader sense would be to develop a robust and comprehensive framework of incentives designed to enhance the motivation of all young people to participate in the opportunities offered to them by training policies. Their participation is the ultimate determinant of the success of these policies.

All participants agreed on the necessity of such links, particularly to employment and industrial policies. It was recognised, however, that establishing such links called for

integrated approaches at policy making level across a variety of departments and agencies, for which governmental machinery did not exist. In fact, the way governments are organised often creates incentives that work against such integration. People looked hopefully to the Australian experience of how a comprehensive policy could work, but it was noted that even there the necessary links to the rest of the education system, largely under the control of the States, did not seem to have been adequately articulated.

b) *The centralisation/decentralisation dilemma*

Everyone agreed on the desirability of moving toward greater decentralisation in the design and implementation of training policies, and the marked move towards decentralisation which was evident in all countries was generally welcomed. But it was also recognised that decentralisation creates new problems. To start with, it is one thing to legislate comprehensive policies, and quite another to co-ordinate such policies among the various interest groups, and among the various levels of regional and local responsibility. As noted by the French delegate, in what amounted to a cri de c8r, even the most rationally legislated national policies will remain ineffective unless they are accompanied by a meticulous process of public dialogue and negotiations, particularly at local levels.

This permeability between local and national interests finds its full expression in the need to maintain nationally recognised standards in skill achievement and qualifications. These standards and qualifications are essential to facilitating worker mobility in highly volatile economies and labour markets. The problem appears most acutely in federally constituted countries, as amply demonstrated at the seminar by the experience of Australia and the United States. It is also echoed in other countries, with unitary forms of government, but with strong regional dimensions in the organisation of vocational education and training, as is the case in Italy. Increasingly, this need is being seen as ever more cogent in view of the growing internationalisation of labour markets particularly among European Union countries. The need for a minimum of internationally recognisable vocational qualifications was repeatedly underlined during the discussions.

c) *The role of the social partners in defining comprehensive policies for vocational education and training*

Two broad policy questions were addressed in this context: what roles can reasonably be expected of employers and unions, and by clarifying these roles, what policies can be pursued to improve VOTEC provision. There were no easy answers to these questions, even though it was generally recognised that the involvement of the social partners was vital to any attempt at revamping VOTEC. For one thing, it was recognised that there are various types of employers and unions. Enterprises may be public sector, or large corporations (like the example of Motorola, which was witnessed on site), or small and medium-sized private firms with limited resources. On the union side, they may be craft-based or industry-based. Enterprise unions, as is the case in Japan, have different incentives and responsibilities from unions organised along industrial lines. In addition, in many countries unions are split according to political ideologies, with corresponding interests and responsibilities. In all cases, the roles that employers and unions can play

depend on the nature of interaction not only between themselves, but also with other actors and stakeholders in society, both at national and local levels.

Within this complexity, three specific forms or levels of co-operation surfaced during the discussion: *i)* partnerships, mostly of a bilateral nature, between business and education, as already discussed, and operating mostly at the local level; *ii)* collective bargaining agreements, primarily between employers and employees, but also involving a role by the State, in which training is becoming an increasingly important component; *iii)* tripartite agreements among employers, unions and the State under which the social partners are systematically consulted and actively involved in policy making, in setting standards in training and in monitoring outcomes as well as the provision of training. A typical case of such tripartism is Germany, where the roles and responsibilities of the various actors are statutorily set out within a regulatory framework. Other countries reach out for the same objective of achieving consensus in the conception and implementation of coherent training policies, but under less regulated arrangements. In all cases, one concern persistently voiced by participants was the need to guard against a predominantly employment-led system of VOTEC education and training. Too much employer control may harm long-term educational objectives, or lead to the unequal distribution of training opportunities.

d) *The process of policy change*

Opinion was divided between the majority of participants who saw reform generated through a series of initiatives around specific problems (*i.e.* a bottom-up approach), and those who advocated a more systemic approach, as was the case in Australia, France and, until recently, Sweden. Advocates of systemic solutions argued that isolated local or sectorial measures are no longer enough. These arrangements might be imaginative and effective in their narrow settings, but many cannot be generalised across the system as a whole, becoming instead mere policy grafts and flashes of success which only illuminate the darkness of under-performing systems. Others argued that change can only come about as an evolutionary process, resulting from the cumulative effect of well-conceived pieces of experimentation, of trial and error.

Conclusion

In this discussion of policy reform, as in so many other issues discussed at the seminar, we could not get away from the realities of national circumstances and traditions. Yet all agreed that the ultimate objective of education and training reform strategies should be the development of a dynamic VOTEC sector. It should be fully integrated in a coherent system of opportunities for life-long learning. VOTEC should contribute to a system in which each individual can participate fully in the social and economic life of rapidly developing societies.

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